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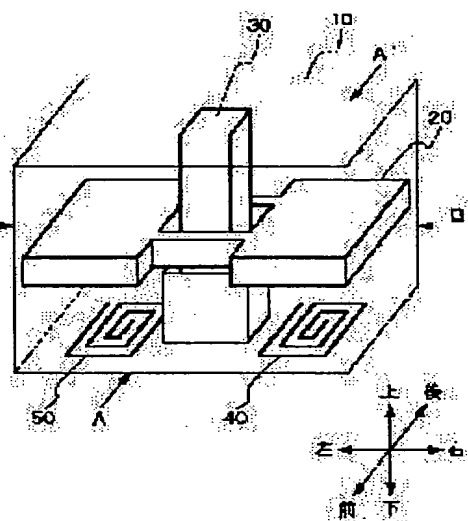
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(54) VIBRATION GENERATING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To stabilize the amount of vibration by operating a pair of magnetic vibration parts in response to a magnetic field being generated by a magnetic field generation part with a support part as an axis.

SOLUTION: In a device, a post 30 toward the upper portion of a case 10 from an area near the center of the bottom surface of the case 10 for covering the entire device is provided, and magnetic field generation devices 40 and 50 are fixed near both the left and right ends sandwiching the post 30 on the bottom surface of the case 10. Also, a vibration generation body 20 is fixed near the center of the post 30 and moves due to the operation of a magnetic field being generated by the magnetic field generation devices 40 and 50. However, magnetization regions at both ends have nearly identical magnetic force and the entire vibration generation body 20 is configured in a shape and weight where it is nearly symmetrical at both sides. Then, the amount of vibration of the vibration generation body 20 is controlled by a pulse voltage that is applied to the magnetic field generation devices 40 and 50, thus obtaining stable vibration without causing scattering of the amount of vibration due to each device if the pulse voltage to be applied to the magnetic field generation device is constant.



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CLAIMS

[Claim(s)]

[Claim 1] An oscillating object and a magnetic field generator are provided. Said magnetic field generator It consists of the magnetic field generating section which generates a magnetic field based on the impressed electrical potential difference, and the electrical-potential-difference impression section which impresses said electrical potential difference to the magnetic field generating section. Said oscillating object It is the vibration generator system characterized by consisting of the supporting-point section and one pair of magnetization oscillating sections prepared in the both ends of said supporting-point section, and for said one pair of magnetization oscillating sections answering said magnetic field generated by said magnetic field generating section, and moving centering on said supporting-point section.

[Claim 2] It is the vibration generator system according to claim 1 which said magnetic field generating section consists of one pair of magnetic field generating sections corresponding to the oscillating section corresponding to said each magnetization oscillating section, and is characterized by said each magnetization oscillating section answering and moving to the magnetic field generated by said each corresponding magnetic field generating section corresponding to the oscillating section.

[Claim 3] Said electrical-potential-difference impression section is a vibration generator system according to claim 1 or 2 which has a voltage adjustment means to adjust the voltage impressed to said magnetic field generating section, and an electrical-potential-difference impression timing means to adjust the time amount which impresses an electrical potential difference to said magnetic field generating section.

[Claim 4] Said magnetic field generating section is a vibration generator system given in either of claims 1-3 characterized by consisting of wiring formed in the coil or the coiled form.

[Claim 5] It is a vibration generator system given in either of claims 1-4 characterized by being prepared so that it may have the stanchion section further, said stanchion section may have the joint joined to said oscillating object in said supporting-point section and movement of said magnetization oscillating section may not be barred.

[Claim 6] It is the vibration generator system according to claim 5 which each of said joint and said supporting-point section consists of a holddown member, and is characterized by boiling said holddown member so that said stanchion section and said oscillating object may be penetrated.

[Claim 7] Said joint and said supporting-point section are a vibration generator system according to claim 5 characterized by consisting of a pair of a hollow and a projection and fitting said projection into said hollow.

[Claim 8] It is a vibration generator system given in either of claims 1-7 which said oscillating object has stops further and are characterized by said stops controlling the movement width of face of vertical motion of said oscillating object by contacting said stanchion section.

[Claim 9] Said stops are vibration generator systems according to claim 8 characterized by consisting of one pair of magnetization oscillating section stops corresponding to said each magnetization oscillating section.

[Claim 10] It is a vibration generator system given in either of claims 1-9 which said stanchion section has the stop receptacle section further, and are characterized by said oscillating object

controlling the movement of face of vertical motion of said oscillating object by contacting said stop receptacle section.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About a vibration generator system, in more detail, this invention is used for oscillating call functions, such as a mobile station and a pager, and relates to the vibration generator system which decreases dispersion in somesthesia vibration.

[0002]

[Description of the Prior Art] Conventionally, oscillating call equipments, such as a cellular phone and a pager, used the vibrating motor in many cases.

[0003] Retroactivity investigation of a patent of the past related to oscillating call equipment and the utility model application is conducted, and it is shown below.

[0004] First, the design "alarm equipment" is indicated by the utility model registration official report No. 2571811. This design is alarm equipment which reports the alarm used for a pager, a cellular phone, etc., and generates both vibration and a sound.

[0005] Next, the design "the actuator for selective-calling receivers" is indicated by JP,2-88346,U. This design is characterized by attaching and vibrating eccentric weight to the revolving shaft of a micro motor about the actuator which takes charge of call actuation of a selective-calling receiver.

[0006] The invention "the vibration generator system for pagers" is indicated by JP,4-3630,A. In the vibration generator system for pagers, this invention connects mutual ends for the oscillating version through an opening at a long tabular stationary plate and its long tabular stationary plate, and carries out opposite arrangement. The armature for electromagnetic-force generating for vibration is fixed to one side of the part which counters mutually [the long tabular stationary plate and diaphragm]. The permanent magnet which consists of a single magnetic pole of N pole or the south pole is fixed to another side, opposite arrangement of the permanent magnet and the armature for electromagnetic-force generating for vibration is carried out, and it is characterized by establishing the intermittent energization turning-on-and-off change means to the armature for electromagnetic-force generating for vibration.

[0007] The invention a "flat vibration generator system" is indicated by JP,6-311693,A. This invention relates to the flat vibration generator system of a carbon button mold cell configuration used for call equipments, such as a pager which tells a call by vibration in a small walkie-talkie etc., etc.

[0008] The invention "an electric-machine-sound converter and personal digital assistant equipment" is indicated by JP,10-215499,A. This invention relates to the electric-machine-sound converter which generates both sounds which vibration which a user can sense, and a user can hear in a single unit.

[0009]

[Problem(s) to be Solved by the Invention] However, in a vibrating motor, since each rotational frequencies differ, the amount of vibration may not become fixed but a weak vibration may occur.

[0010] This invention offers the vibration generator system which can stabilize the amount of vibration using electromagnetic force. Moreover, the vibration generator system which can tune the amount of vibration finely is offered.

[0011] The design currently indicated by the utility model registration official report No. 2571811

generates both vibration and a sound, and differs from the thing about stabilization of the amount of vibration.

[0012] The design currently indicated by JP,2-88346,U and invention currently indicated by JP,6-311693,A differ from the thing using electromagnetic force using a vibrating motor.

[0013] Although invention currently indicated by JP,4-3630,A is the same as this invention in the point of using electromagnetic force, it generates vibration by the intermittent energization turning-on-and-off change to a magnetic field generator, and differs from what attains stabilization of the amount of vibration using electromagnetic force.

[0014] Invention currently indicated by JP,10-215499,A generates both vibration and a sound, and differs from the thing about stabilization of the amount of vibration.

[0015]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, according to this invention, an oscillating object and a magnetic field generator are provided. A magnetic field generator It consists of the magnetic field generating section which generates a magnetic field based on the impressed electrical potential difference, and the electrical-potential-difference impression section which impresses an electrical potential difference to the magnetic field generating section. An oscillating object It consists of the supporting-point section and one pair of magnetization oscillating sections prepared in the both ends of the supporting-point section, and one pair of magnetization oscillating sections answer the magnetic field generated by the magnetic field generating section, and the vibration generator system characterized by moving centering on the supporting-point section is offered.

[0016] In the above-mentioned vibration generator system, the magnetic field generating section consists of one pair of magnetic field generating sections corresponding to the oscillating section corresponding to each magnetization oscillating section, and what is characterized by answering and moving to the magnetic field generated by each corresponding magnetic field generating section corresponding to the oscillating section is possible for each magnetization oscillating section.

[0017] Moreover, in the above-mentioned vibration generator system, what has a voltage adjustment means to adjust the voltage impressed to the magnetic field generating section, and an electrical-potential-difference impression timing means to adjust the time amount which impresses an electrical potential difference to the magnetic field generating section is possible for the electrical-potential-difference impression section.

[0018] Furthermore, in the above-mentioned vibration generator system, what is characterized by consisting of wiring formed in the coil or the coiled form is possible for the magnetic field generating section.

[0019] What is characterized by being prepared so that it may have the stanchion section further, the stanchion section may otherwise have the joint joined to an oscillating object in the supporting-point section in the above-mentioned vibration generator system and movement of the magnetization oscillating section may not be barred is possible.

[0020] Moreover, in the above-mentioned vibration generator system, each of a joint and the supporting-point section consists of a holddown member, and what is characterized by being alike so that the stanchion section and an oscillating object may be penetrated is possible for a holddown member.

[0021] Furthermore, in the above-mentioned vibration generator system, what is characterized by consisting of a pair of a hollow and a projection and fitting a projection into a hollow is possible for a joint and the supporting-point section.

[0022] In addition, in the above-mentioned vibration generator system, an oscillating object has stops further and what is characterized by controlling the movement width of face of vertical motion of an oscillating object is possible for stops by contacting the stanchion section.

[0023] Moreover, in the above-mentioned vibration generator system, what is characterized by consisting of one pair of magnetization oscillating section stops corresponding to each magnetization oscillating section is possible for stops.

[0024] Furthermore, in the above-mentioned vibration generator system, the stanchion section has the stop receptacle section further, and what is characterized by controlling the movement width of face of vertical motion of an oscillating object is possible for an oscillating object by contacting the

stop receptacle section.

[0025] This invention offers the vibration generator system which stabilizes the amount of vibration of rocking equipment by making immobilization the pulse voltage impressed to the magnetic field generator which vibrates rocking equipment using what answers and vibrates to rocking equipment in a magnetic field.

[0026] Moreover, the vibration generator system which tunes the amount of vibration finely is offered by controlling the frequency of the pulse voltage impressed to rocking equipment, and an electrical potential difference.

[0027]

[Embodiment of the Invention] The gestalt of operation of this invention is shown below with reference to a drawing. Drawing 1 is the perspective view having shown the vibration generator system by this invention. For convenience, in the perspective view of drawing 1, the sense is set up, and it illustrates in the lower right section, and explains with reference to the sense set up below.

[0028] Reference of drawing 1 constitutes the vibration generator system by this invention from a stanchion 30 which supports the oscillating generating object 20 and its oscillating generating object 20 for the whole equipment in the wrap case 10, and magnetic field generators 40 and 50 made to generate a magnetic field.

[0029] According to drawing 1, the stanchion 30 which goes to the case 10 upper part from near the center of case 10 base is formed. It is case 10 base and the magnetic field generators 40 and 50 are being fixed near the both ends of the right and left whose stanchion 30 of the was pinched. Moreover, the oscillating generating object 20 is fixed near the center of a stanchion 30. The oscillating generating object 20 has the weight more than a constant rate.

[0030] The oscillating generating object 20 has the magnetization field which becomes both ends from a permanent magnet etc., and exercises in response to an operation of the magnetic field generated with the magnetic field generators 40 and 50. It becomes possible by controlling generating of the magnetic field by the magnetic field generators 40 and 50 to vibrate the oscillating generating object 20.

[0031] Here, the magnetization field of the both ends of the oscillating generating object 20 has the almost same magnetism, and is constituted by an almost symmetrical configuration and weight as the oscillating generating object 20 whole. At this time, the amount of vibration of the oscillating generating object 20 is controlled by the pulse voltage impressed to the magnetic field generators 40 and 50. In addition, in drawing 1, the electrical-potential-difference impression section which impresses an electrical potential difference to the magnetic field generators 40 and 50 is not illustrated. Moreover, the detailed structure which the oscillating generating object 20 shown in the following drawings has is also omitted.

[0032] Drawing 2 is the detail drawing of the oscillating generating object 20 shown in the perspective view of drawing 1. Also in drawing 2, it explains with reference to the sense set up in the perspective view of drawing 1.

[0033] According to drawing 2, the fixed part 23 by which the oscillating generating object 20 fixes both relatively between one pair of the magnetization oscillating objects 21 and 22 and the magnetization oscillating objects 21 and 22 is formed. For convenience, the left magnetization oscillating object 21 and a right-hand side magnetization oscillating object are used as the right magnetization oscillating object 22 for a left-hand side magnetization oscillating object. The oscillating generating object 20 whole is substantially served as the rigid body. An operation of a magnetic field is received in the magnetization oscillating objects 21 and 22 including a permanent magnet.

[0034] Here, the magnetization oscillating objects 21 and 22 have the almost same magnetism, and are constituted by an almost symmetrical configuration and weight as the oscillating generating object 20 whole. Specifically, what consists of only permanent magnets of the same configuration, the same quality of the material, and the same magnetism as magnetization oscillating objects 21 and 22 is desirable.

[0035] A fixed part 23 is also the part which fixes the oscillating generating object 20 to a stanchion 30, and the fixed means is made as [prevent / from magnetization oscillating exercising / 21 and 22 / to vertical hard flow mutually in the right-and-left both ends of the oscillating generating object

20 / an object]. A fixed part 23 consists of a holddown member 231,232 of the shape of one pair of rod left and prepared in the cross direction. For convenience, let the holddown member which is in the front holddown member 231 and a rear face about the holddown member in a front face be the rear-face holddown member 232. There is the cavernous section 24 surrounded by one pair of magnetization oscillating objects 21 and 22 and one pair of holddown members 231,232, and a stanchion 30 is inserted in this cavernous section 24.

[0036] Moreover, let the fields where the front holddown member 231 and the rear-face holddown member 232 counter be the front fixed part inside 233 and the rear-face fixed part inside 234 through the cavernous section 24, respectively. Furthermore, the cavernous section 24 is faced and let the field which is in the left inside 235 and right magnetization oscillating object 22 side about the field in the left magnetization oscillating object 21 side be the right inside 236.

[0037] Drawing 3 is drawing of the stanchion 30 shown in the perspective view of drawing 1 . Also in drawing 3 , it explains with reference to the sense set up in the perspective view of drawing 1 .

[0038] As shown in drawing 3 , a stanchion 30 consists of rectangular parallelepiped-like the lower extension section 31 and the up thin pillar section 32. Moreover, it has the oscillating generating object fixed part 33 which fixes the oscillating generating object 20 to the up thin pillar section 32. The holddown member 231,232 of the oscillating generating object 20 is arranged at the cross direction at the oscillating generating object fixed part 33.

[0039] From the up thin pillar section 32, the lower extension section 31 differs in the magnitude of the cross section in the direction of front and rear, right and left. The lower extension section 32 has the magnitude which does not pass the cavernous section 24 of the oscillating generating object 20. The up thin pillar section 33 has the magnitude which passes the cavernous section 24 of the oscillating generating object 20.

[0040] In the field where the lower extension section 32 and the up thin pillar section 33 touch, it is in the lower extension section 32, and let into the right non-contact section 311 right-hand side which does not contact the up thin pillar section 33, and let left-hand side be the left non-contact section 312. Moreover, the side face of the up thin pillar section 33 is made as the thin pillar section left lateral 321, and a side face is made into the side face 322 before a thin pillar section, the thin pillar section right lateral 323, and the after [a thin pillar section] side face 324, respectively.

[0041] Drawing 4 is drawing in which showing the A-A' cross section (order-vertical cross section) shown in drawing 1 , and showing the condition that the oscillating generating object 20 is being fixed to the stanchion 30.

[0042] First, the projection fixed part 61 is formed in the rear-face fixed part inside 234 of the rear-face holddown member 232, a fixed part 62 and fitting in having been prepared in the after [a thin pillar section] side face 322 of the oscillating generating object fixed part 33, it becomes depressed and the oscillating generating object 20 is fixed to a stanchion 30.

[0043] In order to fix the oscillating generating object 20 to a stanchion 30, it is required for the tip of the projection fixed part 61 and distance with the front fixed part inside 233 to be larger than the distance of the side face 322 before a thin pillar section in the oscillating generating object fixed part 33 and the after [a thin pillar section] side face 324. At this time, as for the oscillating generating object 20, right-and-left both ends move up and down focusing on this fixed part. In addition, the configuration of the projection fixed part 61 and the hollow fixed part 62 has the suitable shape of hemispherical and a cone etc.

[0044] Now, as for the fixed part which becomes depressed with this projection fixed part 61, and consists of a fixed part 62, it is desirable to be prepared near the center of gravity of the oscillating generating object 20. By carrying out a core [near the center of gravity of the oscillating generating object 20], it becomes possible to move oscillating generating object 20 right-and-left both ends up and down smoothly.

[0045] Moreover, since the tip of the projection fixed part 61 and distance with the front fixed part inside 233 are larger than the distance of the side face 322 before a thin pillar section in the oscillating generating object fixed part 33, and the after [a thin pillar section] side face 324, the projection fixed part 61 can be deformed and its member which is constituted by the quality of the material from which a configuration returns when fitting in with the hollow fixed part 62, and has elasticity is desirable.

[0046] The configuration in which it becomes depressed in the rear-face fixed part inside 234 of the rear-face holddown member 232, the fixed part is otherwise prepared, and the projection fixed part was prepared in the after [a thin pillar section] side face 324 of the oscillating generating object fixed part 33 is also possible. In this case, in order to fix the oscillating generating object 20 to a stanchion 30, it is required for the distance of the tip of a projection fixed part and the side face 322 before a thin pillar section in the oscillating generating object fixed part 33 to be larger than the distance of the front fixed part inside 233 and the after [a thin pillar section] side face 324.

[0047] Drawing 5 is drawing in which showing the A-A' cross section (order-vertical cross section) shown in drawing 1 , and showing the 1st modification in the condition that the oscillating generating object 20 is being fixed to the stanchion 30.

[0048] The difference from drawing 4 becomes depressed with the projection fixed part 61 shown in drawing 4 , and is added to a fixed part 62. The projection fixed part 63 becomes depressed on the side face 322 before a thin pillar section of the oscillating generating object fixed part 33, and the fixed part 64 is formed in the front fixed part inside 233 of the front holddown member 231. The oscillating generating object 20 is a point fixed to a stanchion 30 by becoming depressed with the projection fixed part 61, becoming depressed with the projection fixed part 63 about a fixed part 62, and fitting in a fixed part 64, respectively. It becomes depressed with the projection fixed part 63, and the configuration about a fixed part 64, the quality of the material, etc. become depressed with the above-mentioned projection fixed part 61, and are the same as a fixed part 62. Moreover, the oscillating generating object 20 moves the right-and-left both ends centering on this fixed part up and down also in this case.

[0049] Now, the fixed part which becomes depressed with this projection fixed part 61, becomes depressed with a fixed part 62 and the projection fixed part 63, and consists of a fixed part 64 is near the center of gravity of the oscillating generating object 20, and it is desirable for the line which contracts both fixed parts to be an almost perpendicular direction to the vertical motion direction of the oscillating generating object 20. It is for making it possible to move oscillating generating object 20 right-and-left both ends up and down smoothly.

[0050] Furthermore, in order to fix the oscillating generating object 20 to a stanchion 30 in this case, it is required for the distance between both the projection fixed part 61 and 63 to be smaller than the distance of the side face 322 before a thin pillar section of the oscillating generating object fixed part 33 and the after [a thin pillar section] side face 324.

[0051] Otherwise, it becomes depressed with the projection fixed part 61, and becomes depressed about a fixed part 62 in the rear-face fixed part inside 234 of the rear-face holddown member 232, a fixed part is prepared, and projection fixed part ***** is possible on the after [a thin pillar section] side face 322 of the oscillating generating object fixed part 33. Moreover, the configuration with which the projection fixed part was prepared for the fixed part in the side face 322 before a thin pillar section of the oscillating generating object fixed part 33 by becoming depressed with the projection fixed part 63, and becoming depressed in the front fixed part inside 233 of the front holddown member 231 about a fixed part 64 is also possible.

[0052] Drawing 6 is drawing in which showing the A-A' cross section (order-vertical cross section) shown in drawing 1 , and showing the 2nd modification in the condition that the oscillating generating object 20 is being fixed to the stanchion 30.

[0053] The difference from drawing 4 becomes depressed with the projection fixed part 61 shown in drawing 4 , instead of the fixed part 62, the front holddown member 231 of the oscillating generating object 20, the oscillating generating object fixed part 33, and the rear-face holddown member 232 of the oscillating generating object 20 are penetrated, and the axial section 65 is formed.

[0054] This axial section 65 has the structure which is being fixed and does not bar vertical motion of the right-and-left both ends of the oscillating generating object 20, and that oscillating generating object 20 moves the right-and-left both ends centering on that axial section 65 up and down.

[0055] Now, as for this axial section 65, it is desirable to be an almost perpendicular direction and for the axial section 65 to be near the center of gravity of the oscillating generating object 20 to the vertical motion direction of the oscillating generating object 20. It is for making it possible to move oscillating generating object 20 right-and-left both ends up and down smoothly.

[0056] Drawing 7 is the simplified schematic which looked at the vibration generator system of this

invention from the side face. As drawing 7 shows, the magnetic field generators 40 and 50 are connected with the electrical-potential-difference impression section 70, and a magnetic field is generated according to the electrical potential difference impressed by the electrical-potential-difference impression section 70. Moreover, the oscillating generating object 20 supported to the stanchion 30 is established, and it has the composition that the left magnetization oscillating object 21 is arranged in the upper part of the magnetic field generator 40, and the right magnetization oscillating object 22 is arranged in the upper part of the magnetic field generator 50.

[0057] According to an operation of the magnetic field which the magnetic field generators 40 and 50 generated, the force is applied to the permanent magnet contained in the magnetization oscillating objects 21 and 22, and the oscillating generating object 20 exercises as the result. This movement is performed focusing on the part to which the oscillating generating object 20 is being fixed with the stanchion 30, and an end moves to vertical reverse to the other end.

[0058] Drawing 8 shows the 1st example of a configuration of the magnetic field generators 40 and 50. Here, the wiring 41 and 51 in drawing consists of a printed circuit formed in the coiled form, and P [in drawing], P', Q, and Q' shows connection with the electrical-potential-difference impression section 70, makes P, Q, and P' and Q' a group, and it is connected to + pole or - pole. Wiring 41 and 51 is coiled around the same direction in drawing 8. When the electrical potential difference of a same sign is impressed to the magnetic field generators 40 and 50 from the electrical-potential-difference impression section 70, the magnetic field of the same direction is generated.

[0059] The 1st example of the oscillating generating object 20 of operation is shown below.

[0060] The magnetic pole of each permanent magnet which is the configuration by which the magnetic field generators 40 and 50 of drawing 7 are shown by drawing 8; and constitutes the magnetization oscillating objects 21 and 22 of drawing 7 corresponds to actuation of the oscillating generating object 20 when equal at the side which faces the magnetic field generators 40 and 50, and this 1st example of operation is shown below. In addition, in the publication of this 1st example of operation, impression of an electrical potential difference shows impression of a forward electrical potential difference, as long as there is no notice.

[0061] First, if impression of an electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 40, the magnetic field generator 40 will generate a magnetic field, and the left magnetization oscillating object 21 will receive the upward or downward force in response to an operation of the magnetic field. In response to the force, left-hand side moves to the sense of the received force focusing on a fixed part, and right-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0062] Next, if impression of an electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 50, a magnetic field will be generated and, as for the magnetic field generator 50, the right magnetization oscillating object 22 will receive last time the force of the sense which the left magnetization oscillating object 21 received, and the same direction in response to an operation of the magnetic field. In response to the force, right-hand side moves to the sense of the received force focusing on a fixed part, and left-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0063] By performing the above actuation by turns, it becomes possible to generate vibration of the oscillating generating object 20. Moreover, in the above, the actuation same also as a negative electrical potential difference is attained in impression of an electrical potential difference.

[0064] As shown in drawing 9, when impressing the pulse voltage of an opposite phase from the electrical-potential-difference impression section 70 to the magnetic field generators 40 and 50, it becomes possible to generate vibration of the oscillating generating object 20.

[0065] The 2nd example of the oscillating generating object 20 of operation is shown below.

[0066] This 2nd example of operation corresponds to actuation of the oscillating generating object 20 in case the magnetic poles of each permanent magnet which is the configuration by which the magnetic field generators 40 and 50 of drawing 7 are shown by drawing 8, and constitutes the magnetization oscillating objects 21 and 22 of drawing 7 differ in the side which faces the magnetic field generators 40 and 50, and is shown below. In addition, in the publication of this 2nd example of operation, impression of an electrical potential difference shows impression of a forward electrical

potential difference, as long as there is no notice.

[0067] If impression of a forward electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 40, the magnetic field generator 40 will generate a magnetic field, and the left magnetization oscillating object 21 will receive the upward or downward force in response to an operation of the magnetic field. In response to the force, left-hand side moves to the sense of the received force focusing on a fixed part, and right-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0068] If impression of a forward electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 50, the magnetic field generator 50 will generate a magnetic field, and will receive the force of the sense in which the right magnetization oscillating object 22 differs from the sense which the left magnetization oscillating object 21 received last time, in response to an operation of the magnetic field. In response to the force, right-hand side moves to the sense of the received force focusing on a fixed part, and left-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force. That is, when the electrical potential difference of a same sign is applied to the magnetic field generators 40 and 50, the oscillating generating object 20 carries out the same motion.

[0069] Similarly, if impression of a negative electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 40, the magnetic field generator 40 will generate a magnetic field, and will receive the force of the sense in which the left magnetization oscillating object 21 differs from the sense which the left magnetization oscillating object 21 received last time, in response to an operation of the magnetic field. In response to the force, left-hand side moves to the sense of the received force focusing on a fixed part, and right-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0070] If impression of a negative electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 50, a magnetic field will be generated and, as for the magnetic field generator 50, the right magnetization oscillating object 22 will receive last time the force of the sense which the left magnetization oscillating object 21 received, and the same direction in response to an operation of the magnetic field. In response to the force, right-hand side moves to the sense of the received force focusing on a fixed part, and left-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0071] It is the approach of the configuration which makes the oscillating generating object 20 generating vibration by the 2nd example of operation from the above thing, and an approach being configurations shown in drawing 10, and impressing the pulse voltage of positive/negative only to one magnetic field generator by turns, and the configuration shown in drawing 11, and the method of impressing a pulse voltage in phase to both magnetic field generators is possible.

[0072] Drawing 12 shows the 2nd example of a configuration of the magnetic field generators 40 and 50 shown by drawing 7. Here, the wiring 42 and 52 in drawing consists of a printed circuit formed in the coiled form, and R [in drawing], R', S, and S' shows connection with the electrical-potential-difference impression section 70, makes R, S, and R' and S' a group, and it is connected to + pole or - pole. Wiring 42 and 52 is coiled around different sense in drawing 12. When the electrical potential difference of a same sign is impressed to the magnetic field generators 40 and 50 from the electrical-potential-difference impression section 70, a reverse magnetic field is generated mutually.

[0073] In this case, when equal, actuation of the oscillating generating object 20 is equivalent to the actuation shown in the 2nd example of operation at the side by which the magnetic pole of each permanent magnet which constitutes the magnetization oscillating objects 21 and 22 of drawing 7 faces the magnetic field generators 40 and 50.

[0074] The method of vibrating the oscillating generating object 20 becomes possible by the approach of impressing the pulse voltage of positive/negative by turns only at one magnetic field generator, and the method of impressing a pulse voltage in phase to both magnetic field generators, as shown at drawing 11, as shown in drawing 10.

[0075] Moreover, when the magnetic poles of each permanent magnet which constitutes the

magnetization oscillating objects 21 and 22 of drawing 7 differ in the side which faces the magnetic field generators 40 and 50, actuation of the oscillating generating object 20 is equivalent to the actuation shown in the 1st example of operation.

[0076] The method of vibrating the oscillating generating object 20 becomes possible when impressing the pulse voltage of an opposite phase from the electrical-potential-difference impression section 70 to the magnetic field generators 40 and 50, as shown in drawing 9.

[0077] It becomes possible to vibrate the oscillating generating object 20 corresponding to the above 1st or the 2nd example of operation corresponding to the magnetic pole of each magnetization oscillating objects 21 and 22 facing the direction and the magnetic field generators 40 and 50 of the magnetic field which the magnetic field generators 40 and 50 generate.

[0078] Drawing 13 is drawing showing the 1st example which showed the B-B' cross section (vertical-right-and-left cross section) shown in drawing 1, and showed the physical relationship of the oscillating generating object 20, and the stanchion 30 and the magnetic field generators 40 and 50.

[0079] According to drawing 13, the protection height 81 is formed in the left inside 235 of the left magnetization oscillating section 21. When the left magnetization oscillating section 21 exercises down, when the protection height 81 contacts the left non-contact section 311 of a stanchion, or the thin pillar section left lateral 321, movement to down is barred to migration down of a constant rate.

[0080] It becomes possible to control the movement range of down by physical relationship of the protection height 81, the left non-contact section 311, or the thin pillar section left lateral 321. It becomes possible to prevent contact to the magnetic field generator 40 which has the left magnetization oscillating section 21 caudad especially.

[0081] Moreover, although not illustrated, the same effectiveness as the above can be acquired by preparing the same protection height also in the right magnetization oscillating section 22. It becomes possible to prevent contact to the magnetic field generator 50 which has the right magnetization oscillating section 22 caudad especially.

[0082] Drawing 14 is drawing showing the 2nd example which showed the B-B' cross section (vertical-right-and-left cross section) shown in drawing 1, and showed the physical relationship of the oscillating generating object 20, and the stanchion 30 and the magnetic field generators 40 and 50.

[0083] According to drawing 14, the left heights 82 which are a part of left magnetization oscillating section 21 are arranged in the upper part of the left non-contact section 311 of a stanchion 30. Moreover, the right heights 83 which are a part of right magnetization oscillating section 22 are arranged in the upper part of the right non-contact section 312 of a stanchion 30.

[0084] When the left magnetization oscillating section 21 exercises down, when the left heights 82 contact the left non-contact section 311 of a stanchion, or the thin pillar section left lateral 321, movement to down is barred to migration down of a constant rate.

[0085] In the above, it becomes possible to control the movement range of down by physical relationship of the left heights 82, the left non-contact section 311, or the thin pillar section left lateral 321. It becomes possible to prevent contact to the magnetic field generator 40 which has the left magnetization oscillating section 21 caudad especially.

[0086] Moreover, to migration down of a constant rate, when the right magnetization oscillating section 22 exercises down, when the right heights 83 contact the right non-contact section 312 of a stanchion, or the thin pillar section right lateral 323, movement to down is barred.

[0087] Moreover, in the above, it becomes possible to control the movement range of down by physical relationship of the right heights 83, the right non-contact section 312, or the thin pillar section right lateral 323. It becomes possible to prevent contact to the magnetic field generator 50 which has the right magnetization oscillating section 22 caudad especially.

[0088] The configuration shown by drawing 13 and drawing 14 is characterized by taking a configuration which does not cause [of the magnetic field generators 40 and 50] breakage in the vibration generator system of this invention by preventing that the oscillating generating section 20 which needs the weight more than a certain constant rate contacts or collides with the magnetic field generators 40 and 50.

[0089] Moreover, although not illustrated, in order to prevent contact or a collision with a top face

and the oscillating generating section 20 of a case 10, the configuration which prepares a height in the upper thin pillar section right lateral 323 of the oscillating generating object fixed part 33 of a stanchion 30 or/, and the thin pillar section left lateral 321 is also possible.

[0090] In this case, when what corresponds among that prepared height and drawing 13, the protection height 81 shown in drawing 14, the left heights 82, and the right heights 83 contacts to the migration of a constant rate to above [of the end of the oscillating generating section], movement to above [of the end of the oscillating generating section] is barred. The above-mentioned effectiveness is acquired according to the physical relationship of these heights, the protection height 81, the left heights 82, and the right heights 83.

[0091]

[Effect of the Invention] The effectiveness of this invention is controlled by the pulse voltage which impresses the amount of vibration of the oscillating generating section to a magnetic field generator. The oscillating generating section is constituted by an almost symmetrical configuration and weight, and since the both ends of the oscillating generating section have the almost same magnetism, they become possible [obtaining a stable vibration], without dispersion in the amount of vibration by each equipment occurring, if the pulse voltage impressed to a magnetic field generator is fixed.

[0092] Moreover, since it becomes possible to adjust the amount of vibration of a vibration generator system by setting the frequency of the pulse voltage impressed to a magnetic field generator, and an electrical-potential-difference value as arbitration, control of vibration is easy for the 2nd effectiveness of this invention.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] About a vibration generator system, in more detail, this invention is used for oscillating call functions, such as a mobile station and a pager, and relates to the vibration generator system which decreases dispersion in somesthesia vibration.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Conventionally, oscillating call equipments, such as a cellular phone and a pager, used the vibrating motor in many cases.

[0003] Retroactivity investigation of a patent of the past related to oscillating call equipment and the utility model application is conducted, and it is shown below.

[0004] First, the design "alarm equipment" is indicated by the utility model registration official report No. 2571811. This design is alarm equipment which reports the alarm used for a pager, a cellular phone, etc., and generates both vibration and a sound.

[0005] Next, the design "the actuator for selective-calling receivers" is indicated by JP,2-88346,U. This design is characterized by attaching and vibrating eccentric weight to the revolving shaft of a micro motor about the actuator which takes charge of call actuation of a selective-calling receiver.

[0006] The invention "the vibration generator system for pagers" is indicated by JP,4-3630,A. This invention should long tabular mind [a long tabular stationary plate and / its] an opening in the vibration generator system for pagers. The armature for electromagnetic-force generating for vibration fixes to one side of the part which connects and carries out opposite arrangement and counters the oscillating version mutually [the long tabular stationary plate and diaphragm] in mutual ends, the permanent magnet which becomes from the single magnetic pole of N pole or the south pole to another side fixes, opposite arrangement carries out in the permanent magnet and the armature for electromagnetic-force generating for vibration, and it carries out having prepared the intermittent energization turning-on-and-off change means to the armature for electromagnetic-force generating for vibration as the description.

[0007] The invention a "flat vibration generator system" is indicated by JP,6-311693,A. This invention relates to the flat vibration generator system of a carbon button mold cell configuration used for call equipments, such as a pager which tells a call by vibration in a small walkie-talkie etc., etc.

[0008] The invention "an electric-machine-sound converter and personal digital assistant equipment" is indicated by JP,10-215499,A. This invention relates to the electric - machine-sound converter which generates both sounds which vibration which a user can sense, and a user can hear in a single unit.

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EFFECT OF THE INVENTION

[Effect of the Invention] The effectiveness of this invention is controlled by the pulse voltage which impresses the amount of vibration of the oscillating generating section to a magnetic field generator. The oscillating generating section is constituted by an almost symmetrical configuration and weight, and since the both ends of the oscillating generating section have the almost same magnetism, they become possible [obtaining a stable vibration], without dispersion in the amount of vibration by each equipment occurring, if the pulse voltage impressed to a magnetic field generator is fixed.

[0092] Moreover, since it becomes possible to adjust the amount of vibration of a vibration generator system by setting the frequency of the pulse voltage impressed to a magnetic field generator, and an electrical-potential-difference value as arbitration, control of vibration is easy for the 2nd effectiveness of this invention.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in a vibrating motor, since each rotational frequencies differ, the amount of vibration may not become fixed but a weak vibration may occur.

[0010] This invention offers the vibration generator system which can stabilize the amount of vibration using electromagnetic force. Moreover, the vibration generator system which can tune the amount of vibration finely is offered.

[0011] The design currently indicated by the utility model registration official report No. 2571811 generates both vibration and a sound, and differs from the thing about stabilization of the amount of vibration.

[0012] The design currently indicated by JP,2-88346,U and invention currently indicated by JP,6-311693,A differ from the thing using electromagnetic force using a vibrating motor.

[0013] Although invention currently indicated by JP,4-3630,A is the same as this invention in the point of using electromagnetic force, it generates vibration by the intermittent energization turning-on-and-off change to a magnetic field generator, and differs from what attains stabilization of the amount of vibration using electromagnetic force.

[0014] Invention currently indicated by JP,10-215499,A generates both vibration and a sound, and differs from the thing about stabilization of the amount of vibration.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, according to this invention, an oscillating object and a magnetic field generator are provided. A magnetic field generator It consists of the magnetic field generating section which generates a magnetic field based on the impressed electrical potential difference, and the electrical-potential-difference impression section which impresses an electrical potential difference to the magnetic field generating section. An oscillating object It consists of the supporting-point section and one pair of magnetization oscillating sections prepared in the both ends of the supporting-point section, and one pair of magnetization oscillating sections answer the magnetic field generated by the magnetic field generating section, and the vibration generator system characterized by moving centering on the supporting-point section is offered.

[0016] In the above-mentioned vibration generator system, the magnetic field generating section consists of one pair of magnetic field generating sections corresponding to the oscillating section corresponding to each magnetization oscillating section, and what is characterized by answering and moving to the magnetic field generated by each corresponding magnetic field generating section corresponding to the oscillating section is possible for each magnetization oscillating section.

[0017] Moreover, in the above-mentioned vibration generator system, what has a voltage adjustment means to adjust the voltage impressed to the magnetic field generating section, and an electrical-potential-difference impression timing means to adjust the time amount which impresses an electrical potential difference to the magnetic field generating section is possible for the electrical-potential-difference impression section.

[0018] Furthermore, in the above-mentioned vibration generator system, what is characterized by consisting of wiring formed in the coil or the coiled form is possible for the magnetic field generating section.

[0019] What is characterized by being prepared so that it may have the stanchion section further, the stanchion section may otherwise have the joint joined to an oscillating object in the supporting-point section in the above-mentioned vibration generator system and movement of the magnetization oscillating section may not be barred is possible.

[0020] Moreover, in the above-mentioned vibration generator system, each of a joint and the supporting-point section consists of a holddown member, and what is characterized by being alike so that the stanchion section and an oscillating object may be penetrated is possible for a holddown member.

[0021] Furthermore, in the above-mentioned vibration generator system, what is characterized by consisting of a pair of a hollow and a projection and fitting a projection into a hollow is possible for a joint and the supporting-point section.

[0022] In addition, in the above-mentioned vibration generator system, an oscillating object has stops further and what is characterized by controlling the movement width of face of vertical motion of an oscillating object is possible for stops by contacting the stanchion section.

[0023] Moreover, in the above-mentioned vibration generator system, what is characterized by consisting of one pair of magnetization oscillating section stops corresponding to each magnetization oscillating section is possible for stops.

[0024] Furthermore, in the above-mentioned vibration generator system, the stanchion section has

the stop receptacle section further, and what is characterized by controlling the movement width of face of vertical motion of an oscillating object is possible for an oscillating object by contacting the stop receptacle section.

[0025] This invention offers the vibration generator system which stabilizes the amount of vibration of rocking equipment by making immobilization the pulse voltage impressed to the magnetic field generator which vibrates rocking equipment using what answers and vibrates to rocking equipment in a magnetic field.

[0026] Moreover, the vibration generator system which tunes the amount of vibration finely is offered by controlling the frequency of the pulse voltage impressed to rocking equipment, and an electrical potential difference.

[0027]

[Embodiment of the Invention] The gestalt of operation of this invention is shown below with reference to a drawing. Drawing 1 is the perspective view having shown the vibration generator system by this invention. For convenience, in the perspective view of drawing 1, the sense is set up, and it illustrates in the lower right section, and explains with reference to the sense set up below.

[0028] Reference of drawing 1 constitutes the vibration generator system by this invention from a stanchion 30 which supports the oscillating generating object 20 and its oscillating generating object 20 for the whole equipment in the wrap case 10, and magnetic field generators 40 and 50 made to generate a magnetic field.

[0029] According to drawing 1, the stanchion 30 which goes to the case 10 upper part from near the center of case 10 base is formed. It is case 10 base and the magnetic field generators 40 and 50 are being fixed near the both ends of the right and left whose stanchion 30 of the was pinched. Moreover, the oscillating generating object 20 is fixed near the center of a stanchion 30. The oscillating generating object 20 has the weight more than a constant rate.

[0030] The oscillating generating object 20 has the magnetization field which becomes both ends from a permanent magnet etc., and exercises in response to an operation of the magnetic field generated with the magnetic field generators 40 and 50. It becomes possible by controlling generating of the magnetic field by the magnetic field generators 40 and 50 to vibrate the oscillating generating object 20.

[0031] Here, the magnetization field of the both ends of the oscillating generating object 20 has the almost same magnetism, and is constituted by an almost symmetrical configuration and weight as the oscillating generating object 20 whole. At this time, the amount of vibration of the oscillating generating object 20 is controlled by the pulse voltage impressed to the magnetic field generators 40 and 50. In addition, in drawing 1, the electrical-potential-difference impression section which impresses an electrical potential difference to the magnetic field generators 40 and 50 is not illustrated. Moreover, the detailed structure which the oscillating generating object 20 shown in the following drawings has is also omitted.

[0032] Drawing 2 is the detail drawing of the oscillating generating object 20 shown in the perspective view of drawing 1. Also in drawing 2, it explains with reference to the sense set up in the perspective view of drawing 1.

[0033] According to drawing 2, the fixed part 23 by which the oscillating generating object 20 fixes both relatively between one pair of the magnetization oscillating objects 21 and 22 and the magnetization oscillating objects 21 and 22 is formed. For convenience, the left magnetization oscillating object 21 and a right-hand side magnetization oscillating object are used as the right magnetization oscillating object 22 for a left-hand side magnetization oscillating object. The oscillating generating object 20 whole is substantially served as the rigid body. An operation of a magnetic field is received in the magnetization oscillating objects 21 and 22 including a permanent magnet.

[0034] Here, the magnetization oscillating objects 21 and 22 have the almost same magnetism, and are constituted by an almost symmetrical configuration and weight as the oscillating generating object 20 whole. Specifically, what consists of only permanent magnets of the same configuration, the same quality of the material, and the same magnetism as magnetization oscillating objects 21 and 22 is desirable.

[0035] A fixed part 23 is also the part which fixes the oscillating generating object 20 to a stanchion

30, and the fixed means is made as [prevent / from magnetization oscillating exercising / 21 and 22 / to vertical hard flow mutually in the right-and-left both ends of the oscillating generating object 20 / an object]. A fixed part 23 consists of a holddown member 231,232 of the shape of one pair of rod left and prepared in the cross direction. For convenience, let the holddown member which is in the front holddown member 231 and a rear face about the holddown member in a front face be the rear-face holddown member 232. There is the cavernous section 24 surrounded by one pair of magnetization oscillating objects 21 and 22 and one pair of holddown members 231,232, and a stanchion 30 is inserted in this cavernous section 24.

[0036] Moreover, let the fields where the front holddown member 231 and the rear-face holddown member 232 counter be the front fixed part inside 233 and the rear-face fixed part inside 234 through the cavernous section 24, respectively. Furthermore, the cavernous section 24 is faced and let the field which is in the left inside 235 and right magnetization oscillating object 22 side about the field in the left magnetization oscillating object 21 side be the right inside 236.

[0037] Drawing 3 is drawing of the stanchion 30 shown in the perspective view of drawing 1 . Also in drawing 3 , it explains with reference to the sense set up in the perspective view of drawing 1 .

[0038] As shown in drawing 3 , a stanchion 30 consists of rectangular parallelepiped-like the lower extension section 31 and the up thin pillar section 32. Moreover, it has the oscillating generating object fixed part 33 which fixes the oscillating generating object 20 to the up thin pillar section 32. The holddown member 231,232 of the oscillating generating object 20 is arranged at the cross direction at the oscillating generating object fixed part 33.

[0039] From the up thin pillar section 32, the lower extension section 31 differs in the magnitude of the cross section in the direction of front and rear, right and left. The lower extension section 32 has the magnitude which does not pass the cavernous section 24 of the oscillating generating object 20. The up thin pillar section 33 has the magnitude which passes the cavernous section 24 of the oscillating generating object 20.

[0040] In the field where the lower extension section 32 and the up thin pillar section 33 touch, it is in the lower extension section 32, and let into the right non-contact section 311 right-hand side which does not contact the up thin pillar section 33, and let left-hand side be the left non-contact section 312. Moreover, the side face of the up thin pillar section 33 is made as the thin pillar section left lateral 321, and a side face is made into the side face 322 before a thin pillar section, the thin pillar section right lateral 323, and the after [a thin pillar section] side face 324, respectively.

[0041] Drawing 4 is drawing in which showing the A-A' cross section (order-vertical cross section) shown in drawing 1 , and showing the condition that the oscillating generating object 20 is being fixed to the stanchion 30.

[0042] First, the projection fixed part 61 is formed in the rear-face fixed part inside 234 of the rear-face holddown member 232, a fixed part 62 and fitting in having been prepared in the after [a thin pillar section] side face 322 of the oscillating generating object fixed part 33, it becomes depressed and the oscillating generating object 20 is fixed to a stanchion 30.

[0043] In order to fix the oscillating generating object 20 to a stanchion 30, it is required for the tip of the projection fixed part 61 and distance with the front fixed part inside 233 to be larger than the distance of the side face 322 before a thin pillar section in the oscillating generating object fixed part 33 and the after [a thin pillar section] side face 324. At this time, as for the oscillating generating object 20, right-and-left both ends move up and down focusing on this fixed part. In addition, the configuration of the projection fixed part 61 and the hollow fixed part 62 has the suitable shape of hemispherical and a cone etc.

[0044] Now, as for the fixed part which becomes depressed with this projection fixed part 61, and consists of a fixed part 62, it is desirable to be prepared near the center of gravity of the oscillating generating object 20. By carrying out a core [near the center of gravity of the oscillating generating object 20], it becomes possible to move oscillating generating object 20 right-and-left both ends up and down smoothly.

[0045] Moreover, since the tip of the projection fixed part 61 and distance with the front fixed part inside 233 are larger than the distance of the side face 322 before a thin pillar section in the oscillating generating object fixed part 33, and the after [a thin pillar section] side face 324, the projection fixed part 61 can be deformed and its member which is constituted by the quality of the

material from which a configuration returns when fitting in with the hollow fixed part 62, and has elasticity is desirable.

[0046] The configuration in which it becomes depressed in the rear-face fixed part inside 234 of the rear-face holddown member 232, the fixed part is otherwise prepared, and the projection fixed part was prepared in the after [a thin pillar section] side face 324 of the oscillating generating object fixed part 33 is also possible. In this case, in order to fix the oscillating generating object 20 to a stanchion 30, it is required for the distance of the tip of a projection fixed part and the side face 322 before a thin pillar section in the oscillating generating object fixed part 33 to be larger than the distance of the front fixed part inside 233 and the after [a thin pillar section] side face 324.

[0047] Drawing 5 is drawing in which showing the A-A' cross section (order-vertical cross section) shown in drawing 1 , and showing the 1st modification in the condition that the oscillating generating object 20 is being fixed to the stanchion 30.

[0048] The difference from drawing 4 becomes depressed with the projection fixed part 61 shown in drawing 4 , and is added to a fixed part 62. The projection fixed part 63 becomes depressed on the side face 322 before a thin pillar section of the oscillating generating object fixed part 33, and the fixed part 64 is formed in the front fixed part inside 233 of the front holddown member 231. The oscillating generating object 20 is a point fixed to a stanchion 30 by becoming depressed with the projection fixed part 61, becoming depressed with the projection fixed part 63 about a fixed part 62, and fitting in a fixed part 64, respectively. It becomes depressed with the projection fixed part 63, and the configuration about a fixed part 64, the quality of the material, etc. become depressed with the above-mentioned projection fixed part 61, and are the same as a fixed part 62. Moreover, the oscillating generating object 20 moves the right-and-left both ends centering on this fixed part up and down also in this case.

[0049] Now, the fixed part which becomes depressed with this projection fixed part 61, becomes depressed with a fixed part 62 and the projection fixed part 63, and consists of a fixed part 64 is near the center of gravity of the oscillating generating object 20, and it is desirable for the line which contracts both fixed parts to be an almost perpendicular direction to the vertical motion direction of the oscillating generating object 20. It is for making it possible to move oscillating generating object 20 right-and-left both ends up and down smoothly.

[0050] Furthermore, in order to fix the oscillating generating object 20 to a stanchion 30 in this case, it is required for the distance between both the projection fixed part 61 and 63 to be smaller than the distance of the side face 322 before a thin pillar section of the oscillating generating object fixed part 33 and the after [a thin pillar section] side face 324.

[0051] Otherwise, it becomes depressed with the projection fixed part 61, and becomes depressed about a fixed part 62 in the rear-face fixed part inside 234 of the rear-face holddown member 232, a fixed part is prepared, and projection fixed part ***** is possible on the after [a thin pillar section] side face 322 of the oscillating generating object fixed part 33. Moreover, the configuration with which the projection fixed part was prepared for the fixed part in the side face 322 before a thin pillar section of the oscillating generating object fixed part 33 by becoming depressed with the projection fixed part 63, and becoming depressed in the front fixed part inside 233 of the front holddown member 231 about a fixed part 64 is also possible.

[0052] Drawing 6 is drawing in which showing the A-A' cross section (order-vertical cross section) shown in drawing 1 , and showing the 2nd modification in the condition that the oscillating generating object 20 is being fixed to the stanchion 30.

[0053] The difference from drawing 4 becomes depressed with the projection fixed part 61 shown in drawing 4 , instead of the fixed part 62, the front holddown member 231 of the oscillating generating object 20, the oscillating generating object fixed part 33, and the rear-face holddown member 232 of the oscillating generating object 20 are penetrated, and the axial section 65 is formed.

[0054] This axial section 65 has the structure which is being fixed and does not bar vertical motion of the right-and-left both ends of the oscillating generating object 20, and that oscillating generating object 20 moves the right-and-left both ends centering on that axial section 65 up and down.

[0055] Now, as for this axial section 65, it is desirable to be an almost perpendicular direction and for the axial section 65 to be near the center of gravity of the oscillating generating object 20 to the vertical motion direction of the oscillating generating object 20. It is for making it possible to move

oscillating generating object 20 right-and-left both ends up and down smoothly.

[0056] Drawing 7 is the simplified schematic which looked at the vibration generator system of this invention from the side face. As drawing 7 shows, the magnetic field generators 40 and 50 are connected with the electrical-potential-difference impression section 70, and a magnetic field is generated according to the electrical potential difference impressed by the electrical-potential-difference impression section 70. Moreover, the oscillating generating object 20 supported to the stanchion 30 is established, and it has the composition that the left magnetization oscillating object 21 is arranged in the upper part of the magnetic field generator 40, and the right magnetization oscillating object 22 is arranged in the upper part of the magnetic field generator 50.

[0057] According to an operation of the magnetic field which the magnetic field generators 40 and 50 generated, the force is applied to the permanent magnet contained in the magnetization oscillating objects 21 and 22, and the oscillating generating object 20 exercises as the result. This movement is performed focusing on the part to which the oscillating generating object 20 is being fixed with the stanchion 30, and an end moves to vertical reverse to the other end.

[0058] Drawing 8 shows the 1st example of a configuration of the magnetic field generators 40 and 50. Here, the wiring 41 and 51 in drawing consists of a printed circuit formed in the coiled form, and P [in drawing], P', Q, and Q' shows connection with the electrical-potential-difference impression section 70, makes P, Q, and P' and Q' a group, and it is connected to + pole or - pole. Wiring 41 and 51 is coiled around the same direction in drawing 8. When the electrical potential difference of a same sign is impressed to the magnetic field generators 40 and 50 from the electrical-potential-difference impression section 70, the magnetic field of the same direction is generated.

[0059] The 1st example of the oscillating generating object 20 of operation is shown below.

[0060] The magnetic pole of each permanent magnet which is the configuration by which the magnetic field generators 40 and 50 of drawing 7 are shown by drawing 8, and constitutes the magnetization oscillating objects 21 and 22 of drawing 7 corresponds to actuation of the oscillating generating object 20 when equal at the side which faces the magnetic field generators 40 and 50, and this 1st example of operation is shown below. In addition, in the publication of this 1st example of operation, impression of an electrical potential difference shows impression of a forward electrical potential difference, as long as there is no notice.

[0061] First, if impression of an electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 40, the magnetic field generator 40 will generate a magnetic field, and the left magnetization oscillating object 21 will receive the upward or downward force in response to an operation of the magnetic field. In response to the force, left-hand side moves to the sense of the received force focusing on a fixed part, and right-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0062] Next, if impression of an electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 50, a magnetic field will be generated and, as for the magnetic field generator 50, the right magnetization oscillating object 22 will receive last time the force of the sense which the left magnetization oscillating object 21 received, and the same direction in response to an operation of the magnetic field. In response to the force, right-hand side moves to the sense of the received force focusing on a fixed part, and left-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0063] By performing the above actuation by turns, it becomes possible to generate vibration of the oscillating generating object 20. Moreover, in the above, the actuation same also as a negative electrical potential difference is attained in impression of an electrical potential difference.

[0064] As shown in drawing 9, when impressing the pulse voltage of an opposite phase from the electrical-potential-difference impression section 70 to the magnetic field generators 40 and 50, it becomes possible to generate vibration of the oscillating generating object 20.

[0065] The 2nd example of the oscillating generating object 20 of operation is shown below.

[0066] This 2nd example of operation corresponds to actuation of the oscillating generating object 20 in case the magnetic poles of each permanent magnet which is the configuration by which the magnetic field generators 40 and 50 of drawing 7 are shown by drawing 8, and constitutes the magnetization oscillating objects 21 and 22 of drawing 7 differ in the side which faces the magnetic

field generators 40 and 50, and is shown below. In addition, in the publication of this 2nd example of operation, impression of an electrical potential difference shows impression of a forward electrical potential difference, as long as there is no notice.

[0067] If impression of a forward electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 40, the magnetic field generator 40 will generate a magnetic field, and the left magnetization oscillating object 21 will receive the upward or downward force in response to an operation of the magnetic field. In response to the force, left-hand side moves to the sense of the received force focusing on a fixed part, and right-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0068] If impression of a forward electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 50, the magnetic field generator 50 will generate a magnetic field, and will receive the force of the sense in which the right magnetization oscillating object 22 differs from the sense which the left magnetization oscillating object 21 received last time, in response to an operation of the magnetic field. In response to the force, right-hand side moves to the sense of the received force focusing on a fixed part, and left-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force. That is, when the electrical potential difference of a same sign is applied to the magnetic field generators 40 and 50, the oscillating generating object 20 carries out the same motion.

[0069] Similarly, if impression of a negative electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 40, the magnetic field generator 40 will generate a magnetic field, and will receive the force of the sense in which the left magnetization oscillating object 21 differs from the sense which the left magnetization oscillating object 21 received last time, in response to an operation of the magnetic field. In response to the force, left-hand side moves to the sense of the received force focusing on a fixed part, and right-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0070] If impression of a negative electrical potential difference is performed by the electrical-potential-difference impression section 70 to the magnetic field generator 50, a magnetic field will be generated and, as for the magnetic field generator 50, the right magnetization oscillating object 22 will receive last time the force of the sense which the left magnetization oscillating object 21 received, and the same direction in response to an operation of the magnetic field. In response to the force, right-hand side moves to the sense of the received force focusing on a fixed part, and left-hand side moves the oscillating generating object 20 to the sense contrary to the sense of the received force.

[0071] It is the approach of the configuration which makes the oscillating generating object 20 generating vibration by the 2nd example of operation from the above thing, and an approach being configurations shown in drawing 10, and impressing the pulse voltage of positive/negative only to one magnetic field generator by turns, and the configuration shown in drawing 11, and the method of impressing a pulse voltage in phase to both magnetic field generators is possible.

[0072] Drawing 12 shows the 2nd example of a configuration of the magnetic field generators 40 and 50 shown by drawing 7. Here, the wiring 42 and 52 in drawing consists of a printed circuit formed in the coiled form, and R [in drawing], R', S, and S' shows connection with the electrical-potential-difference impression section 70, makes R, S, and R' and S' a group, and it is connected to + pole or - pole. Wiring 42 and 52 is coiled around different sense in drawing 12. When the electrical potential difference of a same sign is impressed to the magnetic field generators 40 and 50 from the electrical-potential-difference impression section 70, a reverse magnetic field is generated mutually.

[0073] In this case, when equal, actuation of the oscillating generating object 20 is equivalent to the actuation shown in the 2nd example of operation at the side by which the magnetic pole of each permanent magnet which constitutes the magnetization oscillating objects 21 and 22 of drawing 7 faces the magnetic field generators 40 and 50.

[0074] The method of vibrating the oscillating generating object 20 becomes possible by the approach of impressing the pulse voltage of positive/negative by turns only at one magnetic field generator, and the method of impressing a pulse voltage in phase to both magnetic field generators, as shown at

drawing 11 , as shown in drawing 10 .

[0075] Moreover, when the magnetic poles of each permanent magnet which constitutes the magnetization oscillating objects 21 and 22 of drawing 7 differ in the side which faces the magnetic field generators 40 and 50, actuation of the oscillating generating object 20 is equivalent to the actuation shown in the 1st example of operation.

[0076] The method of vibrating the oscillating generating object 20 becomes possible when impressing the pulse voltage of an opposite phase from the electrical-potential-difference impression section 70 to the magnetic field generators 40 and 50, as shown in drawing 9 .

[0077] It becomes possible to vibrate the oscillating generating object 20 corresponding to the above 1st or the 2nd example of operation corresponding to the magnetic pole of each magnetization oscillating objects 21 and 22 facing the direction and the magnetic field generators 40 and 50 of the magnetic field which the magnetic field generators 40 and 50 generate.

[0078] Drawing 13 is drawing showing the 1st example which showed the B-B' cross section (vertical-right-and-left cross section) shown in drawing 1 , and showed the physical relationship of the oscillating generating object 20, and the stanchion 30 and the magnetic field generators 40 and 50.

[0079] According to drawing 13 , the protection height 81 is formed in the left inside 235 of the left magnetization oscillating section 21. When the left magnetization oscillating section 21 exercises down, when the protection height 81 contacts the left non-contact section 311 of a stanchion, or the thin pillar section left lateral 321, movement to down is barred to migration down of a constant rate.

[0080] It becomes possible to control the movement range of down by physical relationship of the protection height 81, the left non-contact section 311, or the thin pillar section left lateral 321. It becomes possible to prevent contact to the magnetic field generator 40 which has the left magnetization oscillating section 21 caudad especially.

[0081] Moreover, although not illustrated, the same effectiveness as the above can be acquired by preparing the same protection height also in the right magnetization oscillating section 22. It becomes possible to prevent contact to the magnetic field generator 50 which has the right magnetization oscillating section 22 caudad especially.

[0082] Drawing 14 is drawing showing the 2nd example which showed the B-B' cross section (vertical-right-and-left cross section) shown in drawing 1 , and showed the physical relationship of the oscillating generating object 20, and the stanchion 30 and the magnetic field generators 40 and 50.

[0083] According to drawing 14 , the left heights 82 which are a part of left magnetization oscillating section 21 are arranged in the upper part of the left non-contact section 311 of a stanchion 30. Moreover, the right heights 83 which are a part of right magnetization oscillating section 22 are arranged in the upper part of the right non-contact section 312 of a stanchion 30.

[0084] When the left magnetization oscillating section 21 exercises down, when the left heights 82 contact the left non-contact section 311 of a stanchion, or the thin pillar section left lateral 321, movement to down is barred to migration down of a constant rate.

[0085] In the above, it becomes possible to control the movement range of down by physical relationship of the left heights 82, the left non-contact section 311, or the thin pillar section left lateral 321. It becomes possible to prevent contact to the magnetic field generator 40 which has the left magnetization oscillating section 21 caudad especially.

[0086] Moreover, to migration down of a constant rate, when the right magnetization oscillating section 22 exercises down, when the right heights 83 contact the right non-contact section 312 of a stanchion, or the thin pillar section right lateral 323, movement to down is barred.

[0087] Moreover, in the above, it becomes possible to control the movement range of down by physical relationship of the right heights 83, the right non-contact section 312, or the thin pillar section right lateral 323. It becomes possible to prevent contact to the magnetic field generator 50 which has the right magnetization oscillating section 22 caudad especially.

[0088] The configuration shown by drawing 13 and drawing 14 is characterized by taking a configuration which does not cause [of the magnetic field generators 40 and 50] breakage in the vibration generator system of this invention by preventing that the oscillating generating section 20 which needs the weight more than a certain constant rate contacts or collides with the magnetic field

generators 40 and 50.

[0089] Moreover, although not illustrated, in order to prevent contact or a collision with a top face and the oscillating generating section 20 of a case 10, the configuration which prepares a height in the upper thin pillar section right lateral 323 of the oscillating generating object fixed part 33 of a stanchion 30 or/, and the thin pillar section left lateral 321 is also possible.

[0090] In this case, when what corresponds among that prepared height and drawing 13 , the protection height 81 shown in drawing 14 , the left heights 82, and the right heights 83 contacts to the migration of a constant rate to above [of the end of the oscillating generating section], movement to above [of the end of the oscillating generating section] is barred. The above-mentioned effectiveness is acquired according to the physical relationship of these heights, the protection height 81, the left heights 82, and the right heights 83.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view having shown the vibration generator system by this invention.

[Drawing 2] It is the detail drawing of the oscillating generating object which constitutes the vibration generator system by this invention.

[Drawing 3] It is drawing of the stanchion which constitutes the vibration generator system by this invention.

[Drawing 4] It is the A-A' cross-section (order-vertical cross section) Fig. of the vibration generator system shown in drawing 1.

[Drawing 5] It is the A-A' cross-section (order-vertical cross section) Fig. of the vibration generator system shown in drawing 1, and is drawing showing the 1st modification in the condition that the oscillating generating object is being fixed to the stanchion.

[Drawing 6] It is the A-A' cross-section (order-vertical cross section) Fig. of the vibration generator system shown in drawing 1, and is drawing showing the 2nd modification in the condition that the oscillating generating object is being fixed to the stanchion.

[Drawing 7] It is the simplified schematic which looked at the vibration generator system of this invention from the side face.

[Drawing 8] It is drawing showing the 1st example of a configuration of a magnetic field generator.

[Drawing 9] It is drawing having shown impression of the pulse voltage from the electrical-potential-difference impression section to a magnetic field generator.

[Drawing 10] It is drawing having shown impression of the pulse voltage from the electrical-potential-difference impression section to a magnetic field generator.

[Drawing 11] It is drawing having shown impression of the pulse voltage from the electrical-potential-difference impression section to a magnetic field generator.

[Drawing 12] It is drawing showing the 2nd example of a configuration of a magnetic field generator.

[Drawing 13] It is the B-B' cross-section (vertical-right-and-left cross section) Fig. of the vibration generator system shown in drawing 1.

[Drawing 14] It is the B-B' cross-section (vertical-right-and-left cross section) Fig. of the vibration generator system shown in drawing 1.

[Description of Notations]

10 Case

20 Oscillating Generating Section

21 22 Magnetization oscillating section (21 left magnetization oscillating section 22 right magnetization oscillating section)

23 Fixed Part

231 232 Holddown member (front-face holddown-member [of 231] 232 rear-face holddown member)

233 Front Fixed Part Inside

234 Rear-Face Fixed Part Inside

235 Left Inside

236 Right Inside

24 Cavernous Section

30 Stanchion
31 Lower Extension Section
311 Left Non-contact Section
312 Right Non-contact Section
32 Up Thin Pillar Section
321 Thin Pillar Section Left Lateral
322 Side Face before Thin Pillar Section
323 Thin Pillar Section Right Lateral
324 After [Thin Pillar Section] Side Face
33 Oscillating Generating Object Fixed Part
40 50 Magnetic field generator
41, 42, 51, 52 Wiring
61 63 Projection fixed part
62 64 Hollow fixed part
65 Axial Section
70 Electrical-Potential-Difference Impression Section
81 Protection Height
82 Left Heights
83 Right Heights

[Translation done.]

*** NOTICES ***

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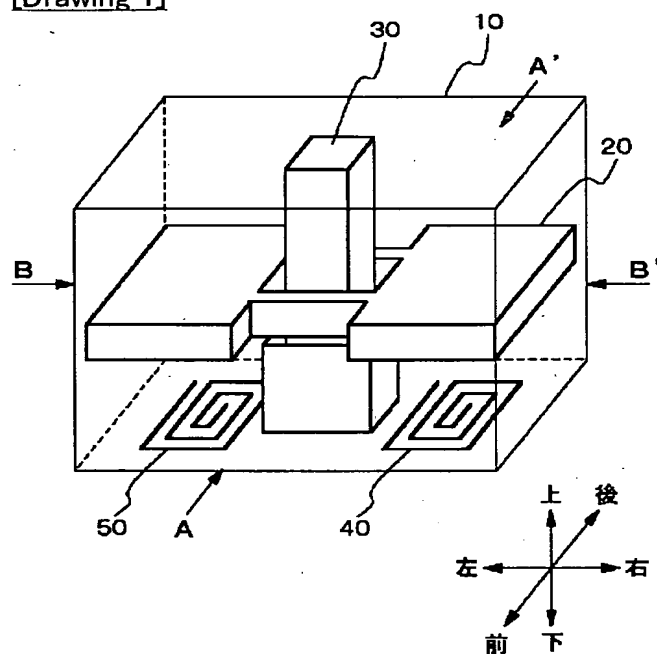
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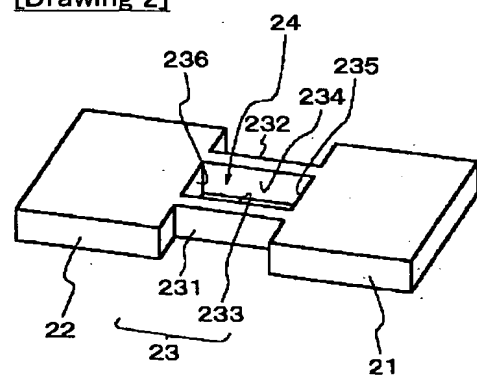
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DRAWINGS

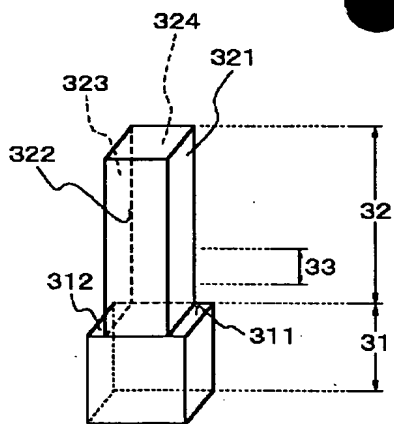
[Drawing 1]



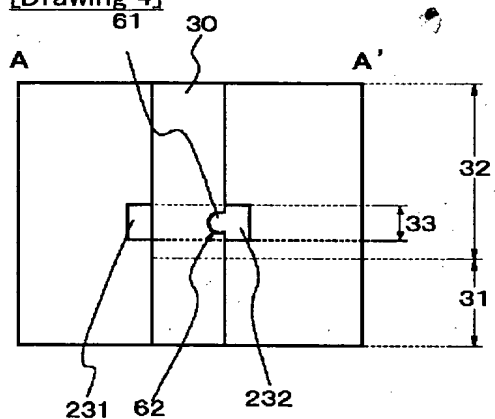
[Drawing 2]



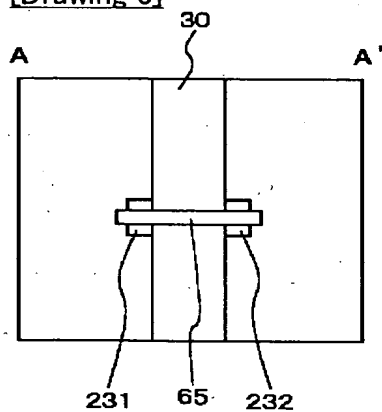
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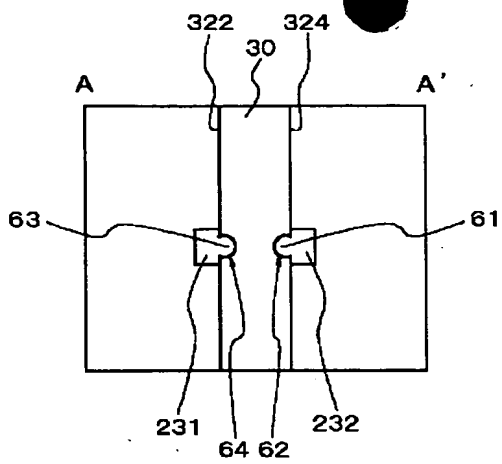
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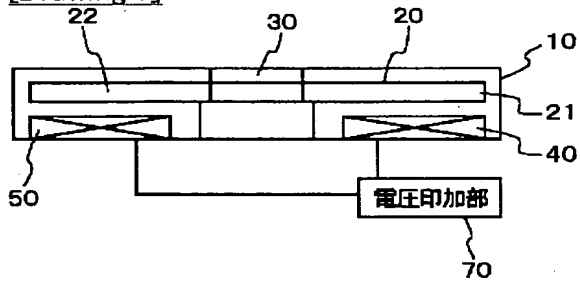
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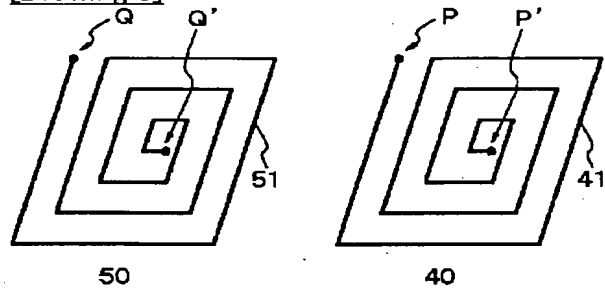
[Drawing 5]



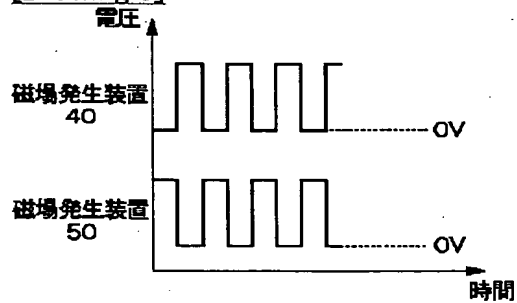
[Drawing 7]



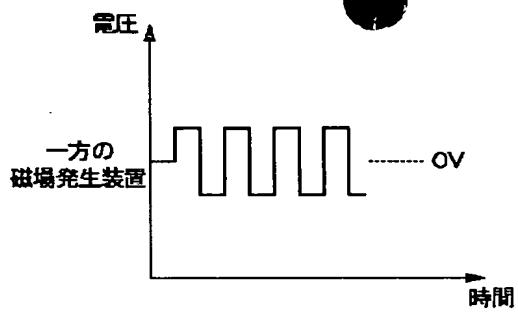
[Drawing 8]



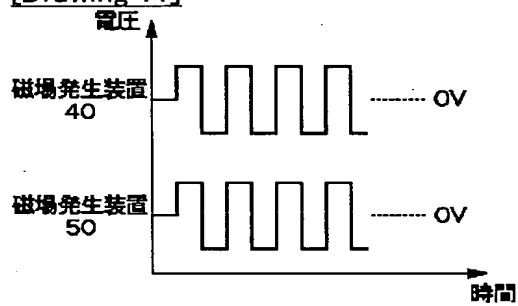
[Drawing 9]



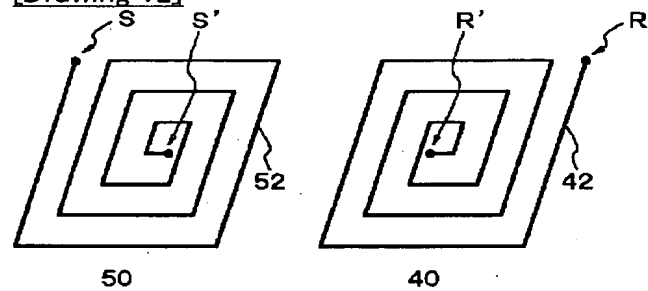
[Drawing 10]



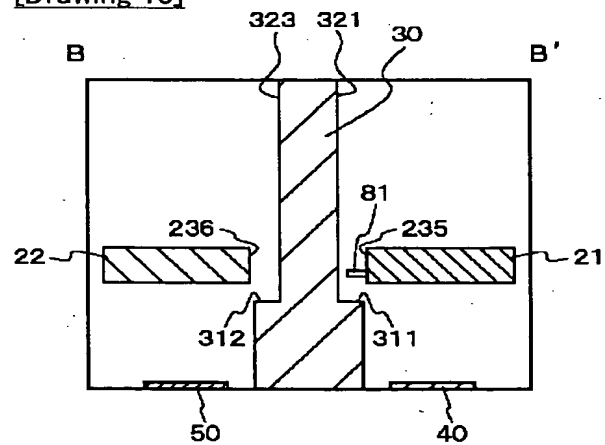
[Drawing 11]



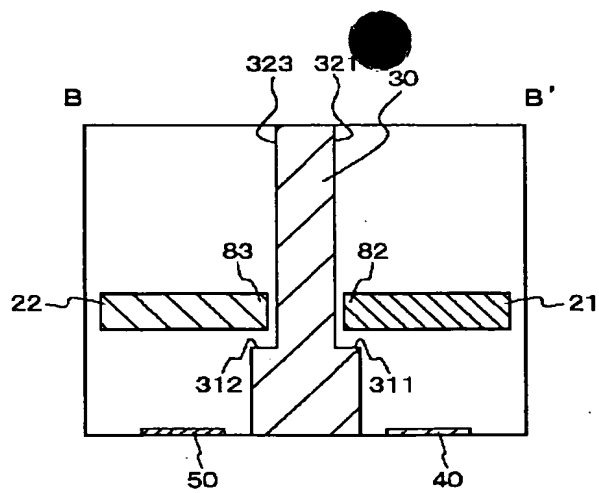
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Translation done.]

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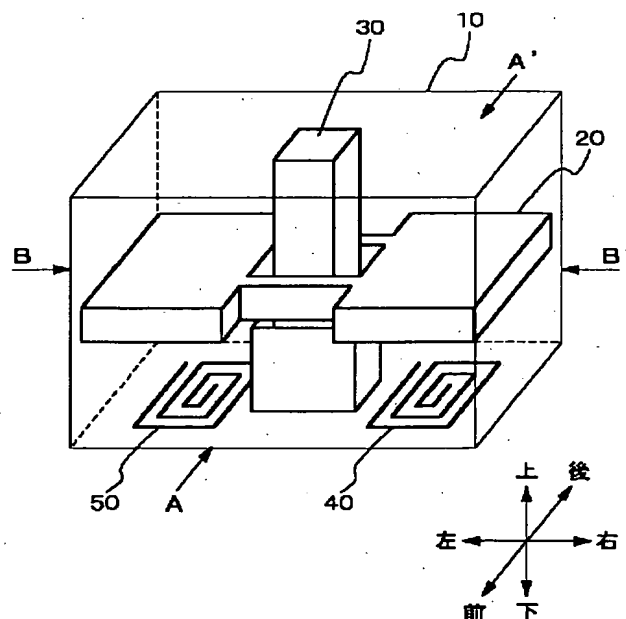
5K067 EE02 FF28 KK17

(54)【発明の名称】 振動発生装置

(57)【要約】

【課題】 体感振動のばらつきを減少させる振動発生装置を提供する。

【解決手段】 振動体と、磁場発生装置を具備し、磁場発生装置は、印加された電圧に基づいて磁場を発生させる磁場発生部と、磁場発生部へ電圧を印加する電圧印加部とからなり、振動体は、支点部と、支点部の両端に設けられた1対の帯磁振動部からなり、1対の帯磁振動部は磁場発生部によって発生させられた磁場に応答して、支点部を軸として動くことを特徴とする振動発生装置を提供する。



(2)

【特許請求の範囲】

【請求項1】 振動体と、磁場発生装置を具備し、前記磁場発生装置は、印加された電圧に基づいて磁場を発生させる磁場発生部と、

磁場発生部へ前記電圧を印加する電圧印加部とからなり、

前記振動体は、支点部と、前記支点部の両端に設けられた1対の帯磁振動部からなり、前記1対の帯磁振動部は前記磁場発生部によって発生させられた前記磁場に応答して、前記支点部を軸として動くことを特徴とする振動発生装置。

【請求項2】 前記磁場発生部は、前記各帯磁振動部に対応する1対の振動部対応磁場発生部からなり、前記各帯磁振動部は対応する前記各振動部対応磁場発生部によって発生させられた磁場に応答して動くことを特徴とする請求項1に記載の振動発生装置。

【請求項3】 前記電圧印加部は、前記磁場発生部へ印加される電圧量を調整する電圧量調整手段と、前記磁場発生部へ電圧を印加する時間を調整する電圧印加時間調整手段を有する請求項1または2に記載の振動発生装置。

【請求項4】 前記磁場発生部は、コイルまたはコイル状に形成された配線からなることを特徴とする請求項1から3のいずれかに記載の振動発生装置。

【請求項5】 支柱部をさらに有し、前記支柱部は、前記支点部において前記振動体と接合する接合部を有し、前記帯磁振動部の運動を妨げないように設けられていることを特徴とする請求項1から4のいずれかに記載の振動発生装置。

【請求項6】 前記接合部と前記支点部の各々は、固定部材からなり、前記固定部材は前記支柱部と前記振動体を貫通するようになっていることを特徴とする請求項5に記載の振動発生装置。

【請求項7】 前記接合部と前記支点部は、窪みと突起のペアからなり、前記窪みに前記突起を嵌合することを特徴とする請求項5に記載の振動発生装置。

【請求項8】 前記振動体は止め具をさらに有し、前記止め具は前記支柱部と接触することによって、前記振動体の上下運動の運動幅を抑制することを特徴とする請求項1から7のいずれかに記載の振動発生装置。

【請求項9】 前記止め具は、前記各帯磁振動部に対応する1対の帯磁振動部止め具からなることを特徴とする請求項8に記載の振動発生装置。

【請求項10】 前記支柱部は止め受け部を更に有し、前記振動体は、前記止め受け部と接触することによって、前記振動体の上下運動の運動幅を抑制することを特

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徴とする請求項1から9のいずれかに記載の振動発生装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、振動発生装置に関し、更に詳しくは、移動局、ページャ等の振動呼び出し機能に使用され、体感振動のばらつきを減少させる振動発生装置に関する。

【0002】

10 【従来の技術】従来、携帯電話、ページャ等の振動呼び出し装置は振動モータを用いることが多かった。

【0003】振動呼び出し装置に関係する過去の特許、実用新案出願を遡及調査して、以下に示す。

【0004】まず、実用新案登録公報第2571811号に、「アラーム装置」という考案が開示されている。この考案は、ページャや携帯電話などに使用するアラームを報知するアラーム装置であって、振動と音の両方を発生させるものである。

20 【0005】次に、実開平2-88346号公報に、「選択呼出し受信機用アクチュエータ」という考案が開示されている。この考案は、選択呼出し受信機の呼び出し動作を担当するアクチュエータに関し、超小型モータの回転軸に偏心ウェイトを取り付けて振動させることを特徴とするものである。

30 【0006】特開平4-3630号公報に、「ページャ用振動発生装置」という発明が開示されている。この発明は、ページャ用振動発生装置において、長板状固定板と、その長板状固定板に空隙を介して振動版を互いの一端同士を連結して対向配置し、その長板状固定板と振動版の互いに対向する部分の一方に振動用電磁力発生用電機子を固定し、他方にN極もしくはS極の単一磁極からなる永久磁石を固定し、その永久磁石と振動用電磁力発生用電機子を対向配置し、振動用電磁力発生用電機子への断続的な通電オン・オフ切り替え手段を設けたことを特徴とするものである。

40 【0007】特開平6-311693号公報に、「偏平型振動発生装置」という発明が開示されている。この発明は、小型無線機などにおいて振動によって呼び出しを伝えるページャ等の呼び出し装置などに用いられるボタン型電池形状の偏平型振動発生装置に関するものである。

【0008】特開平10-215499号公報に、「電気-機械-音響変換機及び携帯端末装置」という発明が開示されている。この発明は、使用者が感じることができ振動と使用者が聞くことができる音の両方を単一のユニットで発生する電気-機械-音響変換機に関する。

【0009】

50 【発明が解決しようとする課題】しかしながら、振動モータでは個々の回転数が異なるため、振動量が一定にはならず、弱い振動が発生する可能性がある。

(3)

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【0010】本発明は、電磁力を用いて振動量の安定化が可能な振動発生装置を提供する。また、振動量の微調整が可能な振動発生装置を提供する。

【0011】実用新案登録公報第2571811号に開示されている考案は、振動と音の両方を発生させるものであり、振動量の安定化に関するものとは異なる。

【0012】実開平2-88346号公報に開示されている考案と、特開平6-311693号公報に開示されている発明は、振動モータを用いたものであり、電磁力を用いたものとは異なる。

【0013】特開平4-3630号公報に開示されている発明は、電磁力を用いる点において本発明と同じであるが、磁場発生装置への断続的な通電オン・オフ切り替えによって振動を発生させるものであり、電磁力を用いて振動量の安定化を図るものとは異なる。

【0014】特開平10-215499号公報に開示されている発明は、振動と音の両方を発生させるものであり、振動量の安定化に関するものとは異なる。

【0015】

【課題を解決するための手段】上記の課題を解決するために、本発明によると、振動体と、磁場発生装置を具備し、磁場発生装置は、印加された電圧に基づいて磁場を発生させる磁場発生部と、磁場発生部へ電圧を印加する電圧印加部とからなり、振動体は、支点部と、支点部の両端に設けられた1対の帯磁振動部からなり、1対の帯磁振動部は磁場発生部によって発生させられた磁場に応答して、支点部を軸として動くことを特徴とする振動発生装置を提供する。

【0016】上記の振動発生装置において、磁場発生部は、各帯磁振動部に対応する1対の振動部対応磁場発生部からなり、各帯磁振動部は対応する各振動部対応磁場発生部によって発生させられた磁場に応答して動くことを特徴とするものが可能である。

【0017】また、上記の振動発生装置において、電圧印加部は、磁場発生部へ印加される電圧量を調整する電圧量調整手段と、磁場発生部へ電圧を印加する時間を調整する電圧印加時間調整手段を有するものが可能である。

【0018】更に、上記の振動発生装置において、磁場発生部は、コイルまたはコイル状に形成された配線からなることを特徴とするものが可能である。

【0019】他に、上記の振動発生装置において、支柱部をさらに有し、その支柱部は、支点部において振動体と接合する接合部を有し、帯磁振動部の運動を妨げないように設けられていることを特徴とするものが可能である。

【0020】また、上記の振動発生装置において、接合部と支点部の各々は、固定部材からなり、固定部材は支柱部と振動体を貫通するようにしていることを特徴とするものが可能である。

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【0021】更に、上記の振動発生装置において、接合部と支点部は、窪みと突起のペアからなり、窪みに突起を嵌合することを特徴とするものが可能である。

【0022】加えて、上記の振動発生装置において、振動体は止め具をさらに有し、止め具は支柱部と接触することによって、振動体の上下運動の運動幅を抑制することを特徴とするものが可能である。

【0023】また、上記の振動発生装置において、止め具は、各帯磁振動部に対応する1対の帯磁振動部止め具からなることを特徴とするものが可能である。

【0024】更に、上記の振動発生装置において、支柱部は止め受け部を更に有し、振動体は、止め受け部と接触することによって、振動体の上下運動の運動幅を抑制することを特徴とするものが可能である。

【0025】本発明は、振動装置に磁場に応答して振動するものを用い、振動装置を振動させる磁場発生装置に印加するパルス電圧を固定にすることにより振動装置の振動量の安定化を行う振動発生装置を提供する。

【0026】また、振動装置に印加するパルス電圧の周波数、電圧を制御することで、振動量の微調整を行う振動発生装置を提供する。

【0027】

【発明の実施の形態】本発明の実施の形態を、図面を参照して以下に示す。図1は、本発明による振動発生装置を示した斜視図である。便宜上、図1の斜視図において、向きを設定して右下部に図示し、以下設定した向きを参照して説明する。

【0028】図1を参照すると、本発明による振動発生装置は、装置全体を覆うケース10の中に、振動発生体20と、その振動発生体20を支える支柱30と、磁場を発生させる磁場発生装置40、50から構成される。

【0029】図1によると、ケース10底面の中央付近からケース10上方に向かう支柱30が設けられている。ケース10底面であって、その支柱30を挟んだ左右の両端付近に磁場発生装置40、50が固定されている。また、支柱30の中央付近で振動発生体20を固定している。振動発生体20は、一定量以上の重量を有する。

【0030】振動発生体20は両端に永久磁石などからなる帯磁領域を有し、磁場発生装置40、50によって発生させた磁場の作用を受けて運動する。磁場発生装置40、50による磁場の発生を制御することによって、振動発生体20を振動させることが可能となる。

【0031】ここで、振動発生体20の両端の帯磁領域はほぼ同一の磁力を有し、また、振動発生体20全体として、ほぼ左右対称な形状、重量によって構成される。この時、振動発生体20の振動量は磁場発生装置40、50に印加されるパルス電圧により制御される。なお、図1において、磁場発生装置40、50に電圧を印加する電圧印加部を図示していない。また、以下の図で示さ

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れる振動発生体20の有する詳細な構造も省略している。

【0032】図2は、図1の斜視図に示される振動発生体20の詳細図である。図2においても、図1の斜視図において設定した向きを参照して説明する。

【0033】図2によると、振動発生体20は、1対の帯磁振動体21、22とその帯磁振動体21、22の間に両者を相対的に固定する固定部23が設けられている。便宜上、左側の帯磁振動体を左帯磁振動体21、右側の帯磁振動体を右帯磁振動体22とする。振動発生体20全体は実質的に剛体として振る舞う。帯磁振動体21、22には永久磁石を含み、磁場の作用を受ける。

【0034】ここで、帯磁振動体21、22はほぼ同一の磁力を有し、また、振動発生体20全体として、ほぼ左右対称な形状、重量によって構成される。具体的には、帯磁振動体21、22として同一形状、同一材質、同一磁力の永久磁石のみから構成されるものが望ましい。

【0035】固定部23は支柱30に振動発生体20を固定する部位でもあり、その固定手段は、振動発生体20の左右両端部にある帯磁振動体21、22が互いに上下逆方向へ運動を行うことを妨げないようになされる。固定部23は前後方向に離れて設けられた1対の棒状の固定部材231、232からなる。便宜上、前面にある固定部材を前面固定部材231、後面にある固定部材を後面固定部材232とする。1対の帯磁振動体21、22と1対の固定部材231、232に囲まれた空洞部24があり、この空洞部24に支柱30が嵌め込まれる。

【0036】また、空洞部24を介して、前面固定部材231と後面固定部材232とが対向する面をそれぞれ前面固定部内面233、後面固定部内面234とする。更に、空洞部24に面し、左帯磁振動体21側にある面を左内面235、右帯磁振動体22側にある面を右内面236とする。

【0037】図3は、図1の斜視図に示される支柱30の図である。図3においても、図1の斜視図において設定した向きを参照して説明する。

【0038】図3に示すように、支柱30は、直方体状の下部拡幅部31と上部細柱部32とからなる。また、上部細柱部32に振動発生体20を固定する振動発生体固定部33を有する。振動発生体固定部33には、振動発生体20の固定部材231、232が前後方向に配置されている。

【0039】下部拡幅部31と上部細柱部32では、前後左右方向における断面の大きさが異なる。下部拡幅部32が振動発生体20の空洞部24を通過させない大きさを有する。上部細柱部33は振動発生体20の空洞部24を通過させる大きさを有する。

【0040】下部拡幅部32と上部細柱部33とが接する面において、下部拡幅部32にあり、上部細柱部33

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と接触しない右側を右非接触部311、左側を左非接触部312とする。また、上部細柱部33の側面を、それぞれ細柱部左側面321、側面を細柱部前側面322、細柱部右側面323、細柱部後側面324とする。

【0041】図4は、図1に示されるA-A'断面（前後一上下断面）を示し、振動発生体20が支柱30に固定されている状態を示す図である。

【0042】まず、後面固定部材232の後面固定部内面234に突起固定部61が設けられており、振動発生体固定部33の細柱部後側面322に設けられた窪み固定部62と嵌合することによって、振動発生体20は支柱30に固定される。

【0043】振動発生体20が支柱30に固定されるためには、突起固定部61の先端と、前面固定部内面233との距離が、振動発生体固定部33における細柱部前側面322と細柱部後側面324との距離よりも大きいことが必要である。この時、振動発生体20はこの固定部を中心として、左右両端が上下運動を行う。なお、突起固定部61、窪み固定部62の形状は、半球状、円錐状などがふさわしい。

【0044】さて、この突起固定部61と窪み固定部62からなる固定部は、振動発生体20の重心近傍に設けられることが望ましい。振動発生体20の重心近傍を中心とすることによって、振動発生体20左右両端の上下運動をスムーズに行うことが可能となる。

【0045】また、突起固定部61の先端と、前面固定部内面233との距離が、振動発生体固定部33における細柱部前側面322と細柱部後側面324との距離よりも大きいために、突起固定部61は変形することが可能で、窪み固定部62と嵌合する時に形状が元に戻る材質によって構成され、弾性を有する部材が望ましい。

【0046】他に、後面固定部材232の後面固定部内面234に窪み固定部が設けられており、振動発生体固定部33の細柱部後側面324に突起固定部が設けられた構成も可能である。この場合に振動発生体20が支柱30に固定されるためには、突起固定部の先端と振動発生体固定部33における細柱部前側面322との距離が、前面固定部内面233と細柱部後側面324との距離よりも大きいことが必要である。

【0047】図5は、図1に示されるA-A'断面（前後一上下断面）を示し、振動発生体20が支柱30に固定されている状態の第1の変形例を示す図である。

【0048】図4との違いは、図4に示される突起固定部61と窪み固定部62に加えて、前面固定部材231の前面固定部内面233に突起固定部63が、振動発生体固定部33の細柱部前側面322に窪み固定部64が設けられており、突起固定部61と窪み固定部62とを、突起固定部63と窪み固定部64とをそれぞれ嵌合することによって、振動発生体20は支柱30に固定される点である。突起固定部63と窪み固定部64に関す

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る形状、材質などは、上記の突起固定部61と窪み固定部62と同じである。また、この場合においても、振動発生体20はこの固定部を中心とした左右両端の上下運動を行う。

【0049】さて、この突起固定部61と窪み固定部62、突起固定部63と窪み固定部64からなる固定部は、振動発生体20の重心近傍であって、両方の固定部を結ぶ線が振動発生体20の上下運動方向に対してほぼ垂直な方向であることが望ましい。振動発生体20左右両端の上下運動をスムーズに行うことを可能とするためである。

【0050】さらに、この場合に振動発生体20が支柱30に固定されるためには、両突起固定部61、63間の距離が、振動発生体固定部33の細柱部前側面322と細柱部後側面324との距離よりも小さいことが必要である。

【0051】他に、突起固定部61と窪み固定部62に関して、後面固定部材232の後面固定部内面234に窪み固定部が設けられ、振動発生体固定部33の細柱部後側面322に突起固定部設けられた構成が可能である。また、突起固定部63と窪み固定部64に関して、前面固定部材231の前面固定部内面233に窪み固定部が、振動発生体固定部33の細柱部前側面322に突起固定部が設けられた構成も可能である。

【0052】図6は、図1に示されるA-A'断面(前後-上下断面)を示し、振動発生体20が支柱30に固定されている状態の第2の変形例を示す図である。

【0053】図4との違いは、図4に示される突起固定部61と窪み固定部62の代わりに、振動発生体20の前面固定部材231と、振動発生体固定部33と、振動発生体20の後面固定部材232とを貫通して心棒部65が設けられている。

【0054】この心棒部65は固定されており、また、振動発生体20の左右両端の上下運動を妨げない構造を有し、また、その振動発生体20は、その心棒部65を中心とした左右両端の上下運動をおこなう。

【0055】さて、この心棒部65は振動発生体20の上下運動方向に対してほぼ垂直な方向であり、心棒部65が振動発生体20の重心近傍にあることが望ましい。振動発生体20左右両端の上下運動をスムーズに行うことを可能とするためである。

【0056】図7は、本発明の振動発生装置を側面から見た簡略図である。図7で示すように、磁場発生装置40、50は、電圧印加部70と接続されており、その電圧印加部70によって印加された電圧に応じて磁場を発生させる。また、支柱30に支えられた振動発生体20が設けられており、左帯磁振動体21が磁場発生装置40の上部に、右帯磁振動体22が磁場発生装置50の上部に配置されている構成となっている。

【0057】磁場発生装置40、50が発生させた磁場

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の作用によって帯磁振動体21、22に含まれる永久磁石に対して力が加えられ、その結果として振動発生体20が運動を行う。この運動は、振動発生体20が支柱30と固定されている部分を中心として行われ、一端は他端に対して上下逆に動く。

【0058】図8は、磁場発生装置40、50の第1の構成例を示す。ここで、図中の配線41、51は、コイル状に形成されたプリント配線等からなり、図中のP、P'、Q、Q'は電圧印加部70との接続を示し、PとQ、P'とQ'を組として、+極または-極へ接続される。図8において、配線41、51は同じ向きに巻かれている。電圧印加部70から同符号の電圧が磁場発生装置40、50に印加された時、同じ向きの磁場を発生させる。

【0059】振動発生体20の第1の動作例を以下に示す。

【0060】この第1の動作例は、図7の磁場発生装置40、50が図8で示される構成であって、図7の帯磁振動体21、22を構成する各永久磁石の磁極が、磁場発生装置40、50に面する側において等しい時の振動発生体20の動作に対応し、以下に示されるものである。なお、この第1の動作例の記載において、電圧の印加は断りがない限り正の電圧の印加を示す。

【0061】まず、電圧印加部70によって電圧の印加が磁場発生装置40に対して行われると、磁場発生装置40は磁場を発生させ、その磁場の作用を受けて左帯磁振動体21が上向きまたは下向きの力を受ける。その力を受けて振動発生体20は固定部を中心として左側がその受けた力の向きへ動き、右側がその受けた力の向きとは逆の向きへ動く。

【0062】次に、電圧印加部70によって電圧の印加が磁場発生装置50に対して行われると、磁場発生装置50は磁場を発生させ、その磁場の作用を受けて右帯磁振動体22が前回左帯磁振動体21が受けた向きと同じ向きの力を受ける。その力を受けて振動発生体20は固定部を中心として右側がその受けた力の向きへ動き、左側がその受けた力の向きとは逆の向きへ動く。

【0063】以上の動作を交互に行うことによって、振動発生体20は振動を発生させることが可能となる。また、上記において、電圧の印加を負の電圧としても同様の動作が可能となる。

【0064】図9に示されるように、電圧印加部70から磁場発生装置40、50へ逆位相のパルス電圧を印加する場合に、振動発生体20は振動を発生させることが可能となる。

【0065】振動発生体20の第2の動作例を以下に示す。

【0066】この第2の動作例は、図7の磁場発生装置40、50が図8で示される構成であって、図7の帯磁振動体21、22を構成する各永久磁石の磁極が、磁場

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発生装置40、50に面する側において異なる時の振動発生体20の動作に対応し、以下に示されるものである。なお、この第2の動作例の記載において、電圧の印加は断りが無い限り正の電圧の印加を示す。

【0067】電圧印加部70によって正の電圧の印加が磁場発生装置40に対して行われると、磁場発生装置40は磁場を発生させ、その磁場の作用を受けて左帯磁振動体21が上向きまたは下向きの力を受ける。その力を受けて振動発生体20は固定部を中心として左側がその受けた力の向きへ動き、右側がその受けた力の向きとは逆の向きへ動く。

【0068】電圧印加部70によって正の電圧の印加が磁場発生装置50に対して行われると、磁場発生装置50は磁場を発生させ、その磁場の作用を受けて右帯磁振動体22が前回左帯磁振動体21が受けた向きと異なる向きの力を受ける。その力を受けて振動発生体20は固定部を中心として右側がその受けた力の向きへ動き、左側がその受けた力の向きとは逆の向きへ動く。つまり、磁場発生装置40、50に同符号の電圧がかけられる時には、振動発生体20は同じ動きをする。

【0069】同様にして、電圧印加部70によって負の電圧の印加が磁場発生装置40に対して行われると、磁場発生装置40は磁場を発生させ、その磁場の作用を受けて左帯磁振動体21が前回左帯磁振動体21が受けた向きと異なる向きの力を受ける。その力を受けて振動発生体20は固定部を中心として左側がその受けた力の向きへ動き、右側がその受けた力の向きとは逆の向きへ動く。

【0070】電圧印加部70によって負の電圧の印加が磁場発生装置50に対して行われると、磁場発生装置50は磁場を発生させ、その磁場の作用を受けて右帯磁振動体22が前回左帯磁振動体21が受けた向きと同じ向きの力を受ける。その力を受けて振動発生体20は固定部を中心として右側がその受けた力の向きへ動き、左側がその受けた力の向きとは逆の向きへ動く。

【0071】以上のことから、第2の動作例によって振動発生体20に振動を発生させる構成と方法は、図10に示す構成であって、一方の磁場発生装置のみに正負のパルス電圧を交互に印加する方法と、図11に示す構成であって、両方の磁場発生装置に同位相のパルス電圧を印加する方法が可能である。

【0072】図12は、図7で示された磁場発生装置40、50の第2の構成例を示す。ここで、図中の配線42、52は、コイル状に形成されたプリント配線等からなり、図中のR、R'、S、S'は電圧印加部70との接続を示し、RとS、R'とS'を組として、+極または-極へ接続される。図12において、配線42、52は異なる向きに巻かれている。電圧印加部70から同符号の電圧が磁場発生装置40、50に印加された時、互いに逆の磁場を発生させる。

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【0073】この場合において、図7の帯磁振動体21、22を構成する各永久磁石の磁極が、磁場発生装置40、50に面する側において等しい場合、振動発生体20の動作は、第2の動作例で示される動作に対応する。

【0074】振動発生体20を振動させる方法は、図10に示すように、一方の磁場発生装置のみに正負のパルス電圧を交互に印加する方法と、図11に示すように、両方の磁場発生装置に同位相のパルス電圧を印加する方法によって可能となる。

【0075】また、図7の帯磁振動体21、22を構成する各永久磁石の磁極が、磁場発生装置40、50に面する側において異なる場合、振動発生体20の動作は、第1の動作例で示される動作に対応する。

【0076】振動発生体20を振動させる方法は、図9に示されるように、電圧印加部70から磁場発生装置40、50へ逆位相のパルス電圧を印加する場合に可能となる。

【0077】磁場発生装置40、50が発生させる磁場の方向と、磁場発生装置40、50に面する各帯磁振動体21、22の磁極に対応して、上記の第1または第2の動作例に対応して、振動発生体20を振動させることが可能となる。

【0078】図13は、図1に示されるB-B'断面(上下一左右断面)を示し、振動発生体20と支柱30、磁場発生装置40、50との位置関係を示した第1の例を示す図である。

【0079】図13によると、左帯磁振動部21の左内面235に保護突起部81が設けられている。左帯磁振動部21が下方向の運動を行う時に、下方向への一定量の移動に対して、保護突起部81が支柱の左非接触部311または細柱部左側面321と接触することによって、下方向への運動を妨げる。

【0080】保護突起部81と左非接触部311または細柱部左側面321の位置関係によって下方向への運動範囲を制御することが可能となる。特に、左帯磁振動部21の下方にある磁場発生装置40との接触を防止することが可能となる。

【0081】また、図示しないが、右帯磁振動部22においても同様の保護突起部を設けることによって、上記と同じ効果を得ることができる。特に、右帯磁振動部22の下方にある磁場発生装置50との接触を防止することが可能となる。

【0082】図14は、図1に示されるB-B'断面(上下一左右断面)を示し、振動発生体20と支柱30、磁場発生装置40、50との位置関係を示した第2の例を示す図である。

【0083】図14によると、左帯磁振動部21の一部である左凸部82が支柱30の左非接触部311の上部に配置されている。また、右帯磁振動部22の一部であ

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る右凸部83が支柱30の右非接触部312の上部に配置されている。

【0084】左帯磁振動部21が下方方向の運動を行う時に、下方方向への一定量の移動に対して、左凸部82が支柱の左非接触部311または細柱部左側面321と接触することによって、下方方向への運動を妨げる。

【0085】上記において、左凸部82と左非接触部311または細柱部左側面321の位置関係によって下方方向への運動範囲を制御することが可能となる。特に、左帯磁振動部21の下方にある磁場発生装置40との接触を防止することが可能となる。

【0086】また、右帯磁振動部22が下方方向の運動を行う時に、下方方向への一定量の移動に対して、右凸部83が支柱の右非接触部312または細柱部右側面323と接触することによって、下方方向への運動を妨げる。

【0087】また、上記において、右凸部83と右非接触部312または細柱部右側面323の位置関係によって下方方向への運動範囲を制御することが可能となる。特に、右帯磁振動部22の下方にある磁場発生装置50との接触を防止することが可能となる。

【0088】図13、図14で示される構成は、本発明の振動発生装置において、ある一定量以上の重量を必要とする振動発生部20が磁場発生装置40、50と接触または衝突することを防止することによって、磁場発生装置40、50の破損原因とならないような構成を取ることを特徴とする。

【0089】また、図示しないが、ケース10の上面と振動発生部20との接触または衝突を防止するために、支柱30の振動発生体固定部33の上方の細柱部右側面323、または／かつ細柱部左側面321に突起部を設ける構成も可能である。

【0090】この場合、振動発生部の一端の上方方向への一定量の移動に対して、その設けられた突起部と図13、図14に示される保護突起部81、左凸部82、右凸部83のうち対応するものが接触することによって、振動発生部の一端の上方方向への運動を妨げる。これら突起部と保護突起部81、左凸部82、右凸部83の位置関係によって、上記の効果が得られる。

【0091】

【発明の効果】本発明の効果は、振動発生部の振動量は磁場発生装置に印加するパルス電圧により制御される。振動発生部はほぼ左右対称な形状、重量によって構成され、振動発生部の両端はほぼ同一の磁力を有するため、磁場発生装置に印加するパルス電圧が一定であれば個々の装置による振動量のばらつきが発生することなく、安定した振動を得ることが可能となる。

【0092】また、本発明の第2の効果は、磁場発生装置に印加するパルス電圧の周波数、電圧値を任意に設定することによって振動発生装置の振動量を調整することが可能となるために、振動の制御が容易である。

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【図面の簡単な説明】

【図1】本発明による振動発生装置を示した斜視図である。

【図2】本発明による振動発生装置を構成する振動発生体の詳細図である。

【図3】本発明による振動発生装置を構成する支柱の図である。

【図4】図1に示される振動発生装置のA-A'断面(前後-上下断面)図である。

10 【図5】図1に示される振動発生装置のA-A'断面(前後-上下断面)図であって、振動発生体が支柱に固定されている状態の第1の変形例を示す図である。

【図6】図1に示される振動発生装置のA-A'断面(前後-上下断面)図であって、振動発生体が支柱に固定されている状態の第2の変形例を示す図である。

【図7】本発明の振動発生装置を側面から見た簡略図である。

【図8】磁場発生装置の第1の構成例を示す図である。

20 【図9】電圧印加部から磁場発生装置へのパルス電圧の印加を示した図である。

【図10】電圧印加部から磁場発生装置へのパルス電圧の印加を示した図である。

【図11】電圧印加部から磁場発生装置へのパルス電圧の印加を示した図である。

【図12】磁場発生装置の第2の構成例を示す図である。

【図13】図1に示される振動発生装置のB-B'断面(上下一左右断面)図である。

30 【図14】図1に示される振動発生装置のB-B'断面(上下一左右断面)図である。

【符号の説明】

10 ケース

20 振動発生部

21, 22 帯磁振動部(21 左帯磁振動部 22 右帯磁振動部)

23 固定部

231, 232 固定部材(231 前面固定部材 232 後面固定部材)

233 前面固定部内面

40 234 後面固定部内面

235 左内面

236 右内面

24 空洞部

30 支柱

31 下部拡幅部

311 左非接触部

312 右非接触部

32 上部細柱部

321 細柱部左側面

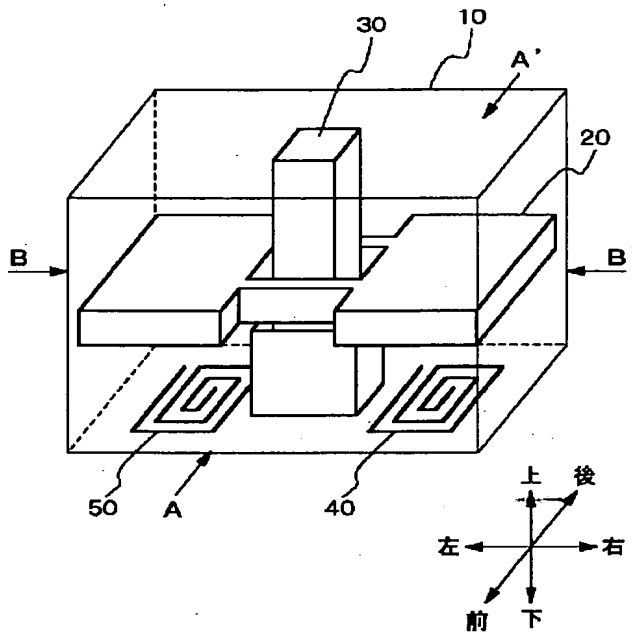
50 322 細柱部前側面

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- 3 2 3 細柱部右側面
 3 2 4 細柱部後側面
 3 3 振動発生体固定部
 4 0, 5 0 磁場発生装置
 4 1, 4 2, 5 1, 5 2 配線
 6 1, 6 3 突起固定部

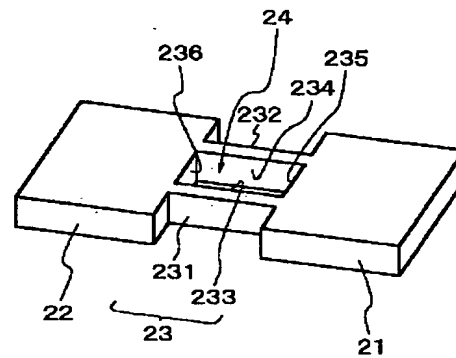
【図1】



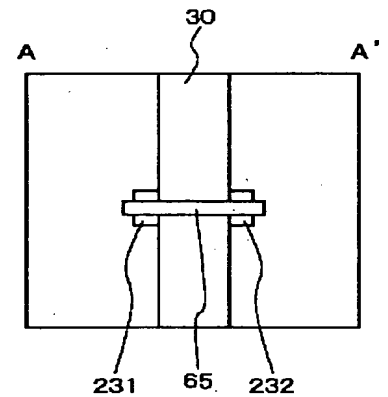
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- 6 2, 6 4 窪み固定部
 6 5 心棒部
 7 0 電圧印加部
 8 1 保護突起部
 8 2 左凸部
 8 3 右凸部

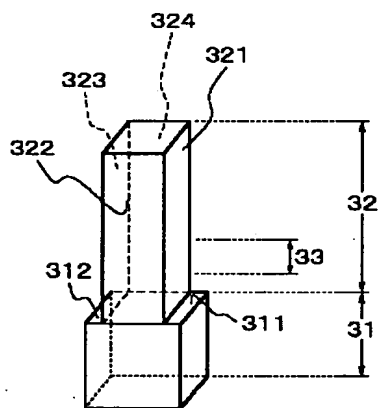
【図2】



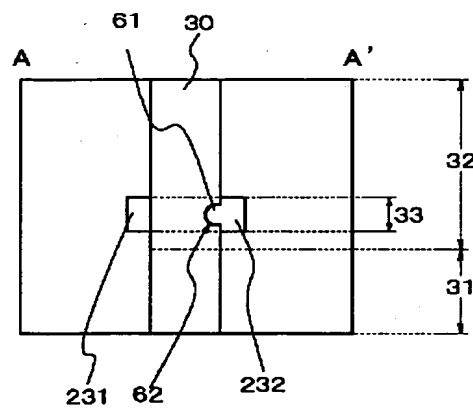
【図6】



【図3】

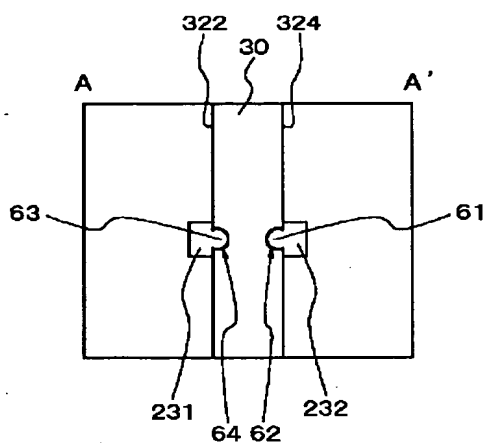


【図4】

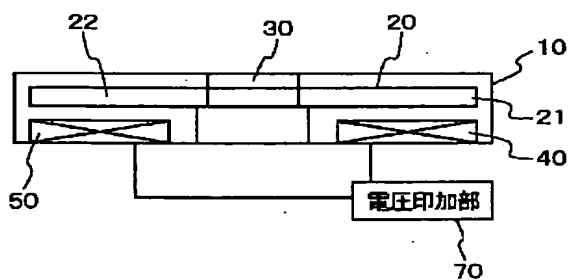


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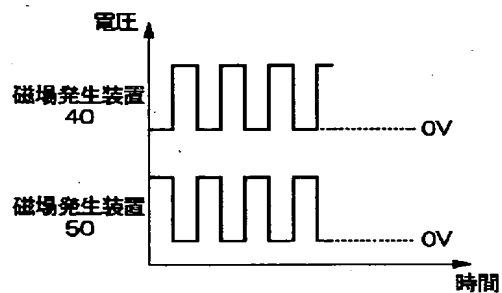
【図5】



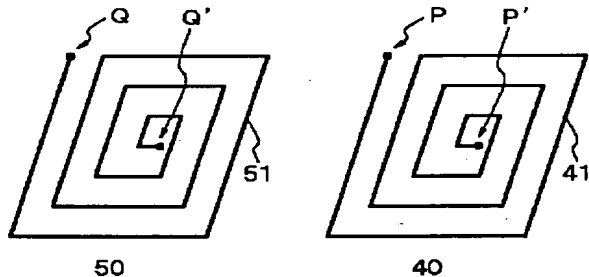
【図7】



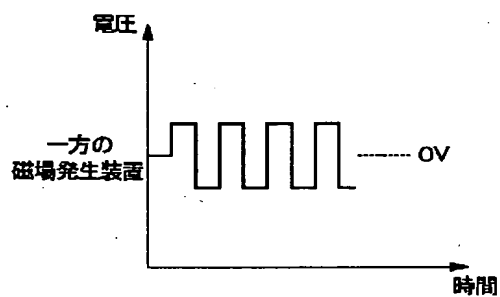
【図9】



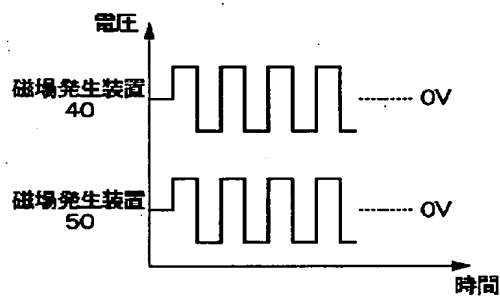
【図8】



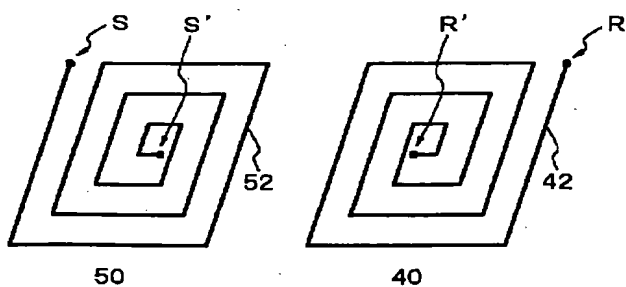
【図10】



【図11】

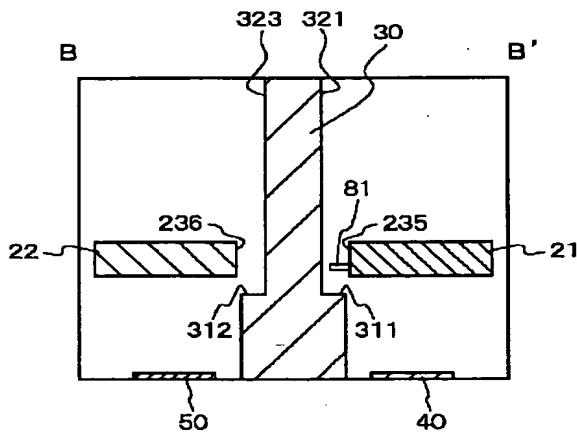


【図12】

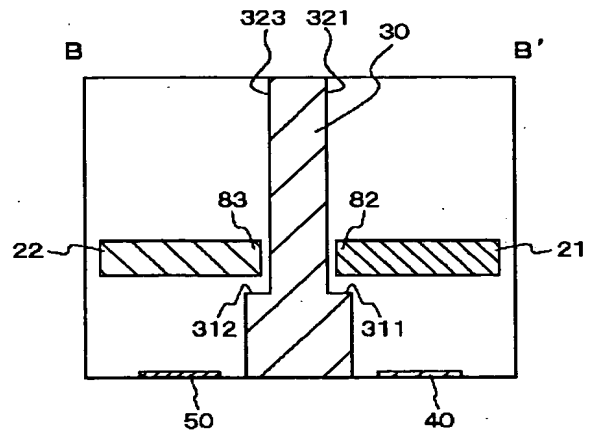


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【図13】



【図14】



【手続補正書】

【提出日】平成11年11月15日（1999. 11. 15）

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】特許請求の範囲

【補正方法】変更

【補正内容】

【特許請求の範囲】

【請求項1】 支柱部と、振動体と、磁場発生装置を具備し、

前記支柱部は、前記振動体の中央部を貫通するように垂直方向に延び、

前記振動体が垂直面内で揺動振動できるように、前記振動体を前記支柱部に揺動自在に固定する固定部材と、

前記振動体は、前記振動体の両端部に設けられた1対の帯磁振動部を有し、

前記磁場発生装置は、前記1対の帯磁振動部から離れて設けられ、1対のパルス電圧にตอบสนองして1対の磁場を発生するための1対の磁場発生部を有し、

前記振動体の前記1対の帯磁振動部は、前記磁場にตอบสนองして前記垂直面内において揺動する振動発生装置。

【請求項2】 前記1対の帯磁振動部は、前記振動体の中央部を中心とする対称な形状であって、ほぼ等しい質量を有し、また前記各帯磁振動部はほぼ同一の磁力を有する、

請求項1に記載の振動発生装置。

【請求項3】 前記1対の帯磁振動部は、同一形状、同一材質、同一磁力の永久磁石からなる、

請求項1または2に記載の振動発生装置。

【請求項4】 前記振動体は、前記パルス電圧の電圧強度によって、前記揺動の揺動幅を制御され、前記パルス電圧の周期によって、前記揺動の揺動周期を制御され

る、

請求項1から3のいずれか1項に記載の振動発生装置。

【請求項5】 前記1対の帯磁振動部は、下面部の磁極が等しく、

前記各磁場発生部は、前記各帯磁振動部の下方に設けられたコイルまたはコイル状に形成された配線からなり、ここで、一方の磁場発生部のコイルまたはコイル状に形成された配線は、他方の磁場発生部のものと同じ向きに巻かれており、

前記電圧印加部は、前記各磁場発生部に逆位相の前記パルス電圧を印加する、

請求項1から4のいずれか1項に記載の振動発生装置。

【請求項6】 前記1対の帯磁振動部は、下面部の磁極が等しく、

前記各磁場発生部は、前記各帯磁振動部の下方に設けられたコイルまたはコイル状に形成された配線からなり、ここで、一方の磁場発生部のコイルまたはコイル状に形成された配線は、他方の磁場発生部のものと逆向きに巻かれており、

前記電圧印加部は、前記各磁場発生部に同位相の前記パルス電圧を印加する、

請求項1から4のいずれか1項に記載の振動発生装置。

【請求項7】 前記1対の帯磁振動部は、下面部の磁極が異なり、

前記各磁場発生部は、前記各帯磁振動部の下方に設けられたコイルまたはコイル状に形成された配線からなり、ここで、一方の磁場発生部のコイルまたはコイル状に形成された配線は、他方の磁場発生部のものと同じ向きに巻かれており、

前記電圧印加部は、前記各磁場発生部に同位相の前記パルス電圧を印加する、

請求項1から4のいずれか1項に記載の振動発生装置。

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【請求項8】 前記1対の帯磁振動部は、下面部の磁極が異なり、
 前記各磁場発生部は、前記各帯磁振動部の下方に設けられたコイルまたはコイル状に形成された配線からなり、
 ここで、一方の磁場発生部のコイルまたはコイル状に形成された配線は、他方の磁場発生部のものと逆向きに巻かれており、
 前記電圧印加部は、前記各磁場発生部に逆位相の前記パルス電圧を印加する。

請求項1から4のいずれか1項に記載の振動発生装置。

【請求項9】 前記振動体は止め具をさらに有し、
 前記止め具は前記支柱部と接触することによって、前記振動体の揺動の揺動幅を抑制する、

請求項1から8のいずれか1項に記載の振動発生装置。

【請求項10】 前記止め具は、前記各帯磁振動部に設けられた1対の帯磁振動部止め具からなる、

請求項9に記載の振動発生装置。

【手続補正書】

【提出日】平成12年3月13日(2000.3.13)

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】特許請求の範囲

【補正方法】変更

【補正内容】

【特許請求の範囲】

【請求項1】 支柱部と、実質的に剛体である振動体と、磁場発生装置を具備し、
 前記支柱部は、前記振動体の中央部を貫通するように垂直方向に延び、前記振動体が垂直面内で揺動振動できるように、前記振動体を前記支柱部に揺動自在に固定する固定部材と、
 前記振動体は、前記振動体の両端部に設けられた1対の帯磁振動部を有し、
 前記磁場発生装置は、前記1対の帯磁振動部から下部に離れて設けられ、1対のパルス電圧に応答して1対の磁場を発生するための1対の磁場発生部を有し、ここで、各磁場発生部は前記1対の帯磁振動部の下面部と平行な面部に設けられた1対のコイル状の配線を有し、
 前記振動体の前記1対の帯磁振動部は、前記1対の磁場に応答して前記垂直面内において揺動する振動発生装置。

【請求項2】 前記1対の帯磁振動部は、前記振動体の中央部を中心とする対称な形状であって、ほぼ等しい質量を有し、また前記各帯磁振動部はほぼ同一の磁力を有する、
 請求項1に記載の振動発生装置。

【請求項3】 前記1対の帯磁振動部は、同一形状、同一材質、同一磁力の永久磁石からなる、
 請求項1または2に記載の振動発生装置。

【請求項4】 前記振動体は、前記パルス電圧の電圧値に基づいて、前記揺動の揺動幅が制御され、前記パルス電圧の周期に基づいて、前記揺動の揺動周期が制御される、

請求項1から3のいずれか1項に記載の振動発生装置。

【請求項5】 前記各磁場発生部に逆位相の前記パルス電圧を印加する電圧印加部をさらに有し、

前記1対の帯磁振動部は、下面部の磁極が等しく、前記各配線は、同じ向きに巻かれている請求項1から4のいずれか1項に記載の振動発生装置。

【請求項6】 前記各磁場発生部に同位相の前記パルス電圧を印加する電圧印加部をさらに有し、

前記1対の帯磁振動部は、下面部の磁極が等しく、前記各配線は、互いに逆向きに巻かれている請求項1から4のいずれか1項に記載の振動発生装置。

【請求項7】 前記各磁場発生部に同位相の前記パルス電圧を印加する電圧印加部をさらに有し、

前記1対の帯磁振動部は、下面部の磁極が異なり、前記各配線は、同じ向きに巻かれている請求項1から4のいずれか1項に記載の振動発生装置。

【請求項8】 前記各磁場発生部に逆位相の前記パルス電圧を印加する電圧印加部をさらに有し、

前記1対の帯磁振動部は、下面部の磁極が異なり、前記各配線は、互いに逆向きに巻かれている請求項1から4のいずれか1項に記載の振動発生装置。

【請求項9】 前記振動体は止め具をさらに有し、
 前記止め具は前記支柱部と接触することによって、前記振動体の揺動の揺動幅を抑制する、

請求項1から8のいずれか1項に記載の振動発生装置。

【請求項10】 前記止め具は、前記各帯磁振動部に設けられた1対の帯磁振動部止め具からなる、

請求項9に記載の振動発生装置。